

FINAL

**Environmental Impact Statement/Report
Coordinated Operation Agreement**

Central Valley Project/State Water Project

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Secretary for Resources
The Resource's Agency

Donald Hodel
Secretary of Interior
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David N. Kennedy
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JOINT ENVIRONMENTAL IMPACT STATEMENT
AND ENVIRONMENTAL IMPACT REPORT

PROPOSED AGREEMENT BETWEEN THE
UNITED STATES OF AMERICA
AND THE
DEPARTMENT OF WATER RESOURCES OF THE
STATE OF CALIFORNIA

FOR COORDINATED OPERATION OF THE
CENTRAL VALLEY PROJECT
AND THE
STATE WATER PROJECT

April 1986



Donald Hodel
Secretary of Interior
Department of Interior

David Houston
Regional Director
Mid-Pacific Region
Bureau of Reclamation

Gordon K. Van Vleck
Secretary for Resources
The Resources Agency

George Deukmejian
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JOINT ENVIRONMENTAL IMPACT STATEMENT
AND ENVIRONMENTAL IMPACT REPORT

PROPOSED AGREEMENT BETWEEN THE
UNITED STATES OF AMERICA
AND THE
DEPARTMENT OF WATER RESOURCES OF THE
STATE OF CALIFORNIA

FOR COORDINATED OPERATION OF THE
CENTRAL VALLEY PROJECT
AND THE
STATE WATER PROJECT

Responsible Agencies

U. S. Department of Interior
Bureau of Reclamation and
California Department of Water Resources

Status: FINAL

Statement number: _____

Filing date: _____

FES 86 - 18

JUL 7 1986

Abstract: The Proposed Action of signing and implementing the draft Coordinated Operation Agreement obligates both the Central Valley Project and the State Water Project to meet water quality and outflow standards extracted from the State Water Resources Control Board Decision 1485 designed for protecting the beneficial uses of the Sacramento-San Joaquin Delta water supply. Without this Agreement (No Action), the Central Valley Project's participation in meeting these standards would not be assured in critically dry years. As compared to No Action, the Proposed Action would have beneficial environmental impacts in the Delta and could have adverse impacts on salmon spawning and rearing in the upper Sacramento and Trinity rivers, depending on how the two water projects would be operated in No Action.

For Further Information Contact

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BUREAU OF INVESTIGATION
California Department of State Services

DATE: 1952
FILE NO: 44-158
JULY 1952

The following is a summary of the information received from the California Department of State Services regarding the activities of the Communist Party, U. S. A., in the State of California. The information was obtained from a report dated July 1, 1952, submitted by the California Department of State Services to the Bureau of Investigation, U. S. Department of Justice. The report states that the Communist Party, U. S. A., is active in the State of California and is engaged in various activities, including the recruitment of new members and the maintenance of existing members. The report also states that the Communist Party, U. S. A., is engaged in various activities, including the recruitment of new members and the maintenance of existing members. The report also states that the Communist Party, U. S. A., is engaged in various activities, including the recruitment of new members and the maintenance of existing members.

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COORDINATION FOR REVIEW OF THE DRAFT AND FINAL
ENVIRONMENTAL STATEMENT/ENVIRONMENTAL IMPACT REPORT

The draft and this final environmental document have been distributed to all agencies, organizations, and individuals who have expressed an interest in the COA. Those indicated by an asterisk (*) provided written comments on the draft.

Federal Agencies

Copies were distributed to the following by the Commissioner, Bureau of Reclamation for review and comment.

U. S. Department of the Interior

Bureau of Indian Affairs
Bureau of Land Management
Bureau of Mines
*Fish and Wildlife Service
Geological Survey
*National Park Service
Western Region Office - Secretary of the Interior

Other Federal Agencies

Advisory Council on Historic Preservation
Council on Environmental Quality
Department of Agriculture
Department of the Army
Department of Commerce
Department of Energy
 Bonneville Power Administration
 Federal Energy Regulatory Commission
Department of Health and Human Services
Department of Housing and Urban Development
Department of Transportation
*Environmental Protection Agency

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Alan Cranston and Pete Wilson

U. S. Congress

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Federal Agencies

Copies were distributed to the following by the Regional Director, Bureau of Reclamation, for information only.

Department of the Interior

Regional Environmental Officer, San Francisco, California
Bureau of Indian Affairs, Sacramento, California
*Fish and Wildlife Service, Portland, Oregon, and Sacramento, California
*National Park Service, San Francisco, California
Geological Survey, Menlo Park, California
Bureau of Land Management, Sacramento, California
Bureau of Mines, Spokane, Washington

Other Federal Agencies

Department of Agriculture
 Forest Service, San Francisco, California
 Soil Conservation Service, Davis, California
Department of the Army, Corps of Engineers, San Francisco and Sacramento, California
Department of Health and Human Services, San Francisco, California
Department of Energy, WAPA, Sacramento, California
Department of Transportation, Highway Administration, San Francisco, California

State and Local Agencies

Copies were distributed to the following by the Regional Director, Bureau of Reclamation, for review and comment.

California State Senate

Ray Johnson; Dan McCorquodale; Barry Keene, Henry J. Mello; John Doolittle; Leroy F. Greene; James W. Nielsen; Wadie P. Deddeh; Milton Marks; Herschel Rosenthal; John Francis Foran; Edward R. Royce; Ed Davis; Alan Robbins; Jim Ellis; Newton R. Russel; Nicholas C. Petris; John Seymour; Daniel E. Boatwright; David A. Roberti; Alfred E. Alquist; Art Torres; Ollie Speraw; H. L. Richardson; John R. Garamendi; Joseph B. Montoya; Rose Ann Vuich; Robert C. Beverly; Walter W. Stiern; Ralph C. Dills; Gary Hart; Bill Greene; Bill Lockyer; Diane Edith Watson; Ken Maddy; Ruben S. Ayala; Paul B. Carpenter; William (Bill) Campbell; William A. Craven; and Robert Presley.

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State Agencies

California State Clearinghouse, Office of the Governor, Sacramento (including
*Department of Fish and Game and *State Water Resources Control Board)

Local Agencies

*South Delta Water Agency
San Joaquin County Flood Control and Water Conservation District
*Alameda County Water District
Hospital Water District
Westlands Water District
Arvin-Edison Water Storage District
Kern County Water Agency
Tulare Irrigation District
Terra Bella Irrigation District
Berrenda Mesa Water District
Rag Gulch Water District
Glenn-Colusa Irrigation District
Orland-Artios
Westside Water District
Shasta County Water Agency
Metropolitan Water District of Southern California
Anderson-Cottonwood Irrigation District
Shasta Dam Area Public Utility District, City of Redding
Bella Vista Water District
Clear Creek Community Services District
City of Antioch
*Contra Costa Water Agency
East Bay Municipal Utility District
Suisun Resource Conservation District
Tulare Lake Basin and Irrigation District
Central Delta Water Agency
Lower Tule River Irrigation District
Orange County
Contra Costa Water District
*Santa Clara Valley Water District
Rosedale-Rio Bravo Water Storage District
East Contra Costa Irrigation District
Reclamation District 2060
Casitas Municipal Water District
Association of California Water Agencies
San Gabriel Valley Municipal Water District
Yuba County Water District
Reclamation District 2064
Banta-Carbona Irrigation District
Kings County Planning Agency
Mojave Water Agency
Sonoma County Library
San Bernardino County Library
Butte County

Glenn County Planning Department
Solano County Public Works
Kern County Planning
Provident Irrigation District
Kanawha Water District
Calaveras County Planning Department
Plumas County Flood Control and Water Conservation District
*San Juan Suburban Water District
Tulare County Board of Supervisors
Desert Water Agency
San Geronio Pass Water Agency
Keswick Community Services District
Yolo County Flood Control and Water Conservation District
Kings County Water District
San Luis Canal County
San Benito County Water Conservation and Flood Control District
Madera Irrigation District
Coachella Valley Water District
Saucelito Irrigation District
Princeton-Codora-Glenn Irrigation District
Central San Joaquin Water Conservation District
Sacramento Municipal Utility District
Glenn County Board of Supervisors
Northridge Water District
County of Tuolumne Board of Supervisors
Modesto Irrigation District
Monterey County Flood Control and Water Conservation District
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Placer County Board of Supervisors
*Colusa County Water District
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Reclamation District 108
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City of Folsom
El Dorado Irrigation District
Grassland Water District
Shafter-Wasco Irrigation District
City of Coalinga
Devil's Den Water District
Green Valley Water District
*Trinity County
Foresthill Public Utility District
Thomas Creek Water District
Antelope Valley East Kern Water Agency
Sacramento County Water Agency
Palm Springs Public Library
Bethel Island Municipal Improvement District
Brannan-Andrus Levee Maintenance District
Contra Costa
Broadview Water District
Fresno County Farm Bureau
Castaic Lake Water Agency

City of Redding
*Sacramento Valley Westside Canal Association
*Central Valley Project Water Association
*Northern California Power Agency
*North Delta Water Agency
Central California Irrigation District
Pacheco Water District
Palmdale Water District
Orange Cove Irrigation District
Corcoran Irrigation District
Chowchilla Water District
San Bernardino Valley Municipal Water District
Dudley Ridge Water District
Alpaugh Irrigation District
Delano-Earlimart Irrigation District
Wasco Semitropic Water Storage District
Westley Hospital Water District
Alameda County Flood Control and Water Conservation District
Orland-Artois Water District
City of Rio Vista
State Water Contractors Audit Committee
Sacramento County Environmental Section
San Joaquin County
San Bernardino County
James Irrigation District
Mercy Springs Water District
City of Watsonville
Union Island Reclamation District 2

Organizations

*Bay Institute of San Francisco
State Water Contractors
J. B. Summers CE, Inc.
CH2M Hill
Montgomery Engineers
Environmental Defense Fund
Marin Conservation League
United Anglers of California
California Wildlife Federation
Save San Francisco Bay Association
California Academy of Sciences
Buena Vista Audubon Society
Cooperative Extension, University of California, Science and Industry Department
Western Water Education Foundation
Pacific Rod and Gun Club
Burris, Lagerlof, Swift, and Senecal, Oceanic Society
Sierra Club
River Garden Farms Co.
Minasian, Minasian, Minasian, Spruance, Baber, Meith and Soares, Attorneys at Law
Friends of the Earth
Friant Water Users Association
California Water Resources Association
Klamath-Trinity River Coalition, Inc.
Friends of the River

Newhall Land and Farming Co.
*Natural Resources Defense Council
Redding Chamber of Commerce
Pacific Gas and Electric Company
Murray, Burns and Kienlen
*California Waterfowl Association
*Lake Shasta Caverns
California Fly Fishermen Unlimited
Delta Water Users Association
Sequoia Audubon Society
San Joaquin River Water Users Company
California Striped Bass Association
Bookman-Edmonston Engineering, Inc.
TERA Corporation
Stockton Sportsmen Club
R. L. Mitchel Associates
Laguna Hills Audubon
Delta Environmental Advisory Committee
Resource Management Associates
San Felipe Committee
*Committee for Water Policy Concensus
*Defenders of Wildlife
*Sacramento River Preservation Trust
*California Trout
Marine Research Center
San Jose Sportsmens Club
National Water Resources Association
R. L. Schafer and Associates, Inc.
Stetson Engineers, Inc.
Salmon Unlimited
Leedshill-Herkenhoff, Inc.
Sacramento League of Women Voters
*National Audubon Society

Individuals

Mike Geranio; Harry S. Dixon; Francis H. Saunders; Allan Thode; John L. Winther;
Parker M. Holt; Ernest A. Engelburt; Michael Smith; Fredrick Bold, Jr.; Mary C. Jacks;
Merrill R. Goodall; F. B. Young; Iila N. Collin; William E. Warne; Yosh Hamatani; Lee
Walton; R. V. Thomas; D. W. Kelly; Tom Kearcher; Harold A. Keelen, Jr.; James E.
Cummins; Dean Thompson; Leroy Dutra; Richard M. Boswell; Samuel E. Wood; Richard Sitts;
Col. R. Dana Fish; Pete Ratto, Sr.; Eunice Hunt; Ronald Robie; Paul E. Minor; Edgar
Wilson; Ken G. Murray; Albert A. Amaro; Wes Anderson; Stacy Lee; Walter C. Sniz; Amalio
Gomez; Vernon Bengal; Galen Whitney; Robert Pafford; Chet Sarsfield; R. W. Hollis;
Kelly Nimtz; Alfred R. Golze; Robert E. Thorsen; Michael Simpson; L. K. Donlin; Edward
Taylor; Dorothy Green; Wayne Waters; Marshall Jones

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INTRODUCTION

The alternative preferred by the Department of Water Resources and the U. S. Bureau of Reclamation is signing and implementing the draft Coordinated Operation Agreement of May 20, 1985 as presented in Appendix A of the Draft Environmental Impact Statement/Report. This agreement obligates both the Federal Central Valley Project and the State Water Project to meet water quality and outflow standards taken from State Water Resources Control Board Decision 1485 for protecting beneficial uses of the Sacramento-San Joaquin Delta water supply. This agreement is designed to increase the efficient use of existing water supplies by defining a sharing process for the State Water Project and the Central Valley Project to meet in-basin use and exports.

After careful evaluation of all comments received on the Draft Environmental Impact Statement/Report, it was determined that no significant impacts would be caused by implementation of the Coordinated Operation Agreement, and therefore no mitigation is recommended. Also, many of the commenting agencies and individuals favored implementation of the Coordinated Operation Agreement.

The essence of the agreement is the sharing formula, which provides for a Central Valley Project/State Water Project proportionate split of 75/25 responsibility for meeting in-basin use from stored water releases and 55/45 for the capture and export of excess flow. Both parties also agree to meet a specified set of Delta water quality standards (Exhibit A of the May 20, 1985, Agreement) from State Water Resources Control Board Decision 1485. Exhibit A standards are a set of water quality standards and export and flow restrictions that define the Delta portion of in-basin use requirements.

These standards provide more environmental protection than the Bureau's present water quality requirements, known as "Tracy standards", by adding about 100 new protective criteria at 15 additional Delta locations. This agreement also requires a commitment of about 2.3 million acre-feet from both projects during a critical water supply period to meet Delta flow and quality protective needs.

The Final Environmental Impact Statement/Report is in four sections. Section 1 contains discussions of 16 general issues that represent and respond to comments on the Draft Environmental Impact Statement/Report. These issues represent subjects requiring more clarification.

Section 2 presents actual corrections and additions to the Draft Environmental Impact Statement/Report based on comments received during the public review period. This section provides information on comments requiring more specific detail than provided in Section 1, including new wording for changes to the text of the draft report.

Section 3 contains copies of all letters received on the draft report and copies of transcripts of both public meetings. This section shows questions and various points of view of agencies and individuals who commented on the draft report.

The Draft Environmental Impact Statement/Report is included as Section 4.

The information contained in this document, which also incorporates the Draft Environmental Impact Statement/Report, fulfills both the Federal and State environmental guidelines for the content of a Final Environmental Impact Statement/Report.

Public Involvement

Guidelines of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA) require that the sponsoring or lead agency respond in writing to all comments received during public review of a draft environmental impact statement report. The responses to these comments, the draft environmental impact statement/report, and revisions to the draft report constitute the final environmental impact statement/report.

Public participation has been important in developing the Coordinated Operation Agreement Environmental Impact Statement/Report. Early and regular consultation with responsible agencies and the public was instrumental in preparing the Draft Environmental Impact Statement/Report (see Appendix C of the draft report).

About 700 copies of the draft report were initially distributed for public and agency review; subsequently about 300 additional copies were distributed upon request. Notices were placed in major newspapers throughout the State notifying the public of meetings and the availability of the draft report.

Issuance of the draft report on September 13, 1985, initiated a 60-day public and agency review period, ending November 13, 1985. During this period, two public meetings were held to receive comments on the draft report: one on October 22 in Sacramento and one on November 7 in Concord, California. Twelve speakers provided oral comments at the two meetings. During the review period, 34 letters were received, providing comments on the draft report. These commenting entities are listed below: National Audubon Society (Audubon), Lake Shasta Caverns, California Waterfowl Association, Committee for Water Policy Consensus (Com Water Pol Con), Defenders of Wildlife, The Bay Institute of San Francisco, Natural Resources Defense

Council, Inc. (NRDC), Sacramento River Preservation Trust, California Trout, Inc., Yolo-Zamora Water District, Sacramento Valley Westside Canal Association, San Juan Suburban Water District, South Delta Water Agency, Colusa County Water District, Santa Clara Valley Water District, Central Valley Project Water Association (CVPWA), North Delta Water Agency, Central California Valleys Flood Control Association (CCVFCA), Contra Costa County Water Agency (CCC WA), Northern California Power Agency, Trinity County, Alameda County Water District, Department of Fish and Game (DFG), Native American Heritage Commission (Nat Am Hert Com), State Water Resources Control Board (SWRCB), Office of Planning and Research (OPR), Environmental Protection Agency (EPA), Bureau of Land Management (BLM), Corps of Engineers (COE), National Park Service and the U. S. Fish and Wildlife Service.

Oral presentations were given by the following: Richard Spotts, Gerald Schumacher, Norman Sturm, John Lawrence, Lori Griggs, John Divito, Laura King, William Davoren, David Okita, Tom Graff, Frederick Bold, and Tom Torlakson.

This was a complex and somewhat unique project, touching on many significant and sensitive issues. Many comments raised issues that, although related to project operations, were beyond the scope and intent of the Coordinated Operation Agreement, and were generally related to separate or future actions not governed by the Agreement. Even though these are separate issues, they are important to clarify, and the general issues section provides discussion on these points.

Responses to comments received are presented in two ways. First, because a number of the comments touched on the same issues, these comments were grouped into general issues, and a single, expanded response to each of these major issues was provided. Second, comments

that did not fall within the scope of one or more of the general issues or that required changes to the text were dealt with specifically in Section 2, Corrections and Additions.

Table 1 presents a matrix listing of all those who provided comments, a list of the 16 general issues, and an indication of how each letter or oral comment was treated.

Review of general issues found important subjects requiring more discussion for clarification; however, no significant impacts attributable to implementing the Coordinated Operation Agreement were identified after review of all issues. It should also be noted that the issue descriptions in the general issue section represent views of commentators, and do not necessarily reflect views of the Department of Water Resources or the Bureau of Reclamation.

Table 1

COMMENTS AND ISSUES

<u>Alternatives</u>	<u>Reauthorization</u>	<u>Decision 1485</u>	<u>Future Standards</u>	<u>Water Marketing</u>	<u>Salmon</u>	<u>Striped Bass</u>	<u>Suisun Marsh</u>	<u>San Francisco Bay</u>
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Letters Received

Audubon		X		X	X			
Lake Shasta Caverns								
Calif Waterfowl Assoc	X			X			X	
Com Water Pol Consensus	X	X	X	X	X	X	X	X
Def Wildlife	X	X		X		X		
Bay Inst SF		X		X				
NRDC	X	X	X	X	X			
Sacto River Pres Trust	X				X			
California Trout		X		X	X			X
Yolo-Zamora WD				X				
Sac Val West Canal Assoc				X				
San Juan WD				X				
South Delta WA		X		X				
Colusa County WD								
Santa Clara WD								
CVP Water Association				X				
North Delta WA/CCVFCA								
CCC WA		X	X	X	X	X	X	X
North Calif Power								
Trinity County					X			
Alameda County WD								
DFG (11-13)				X	X			X
DFG (10-29)								
Nat Am Hert Com								
SWRCB		X	X	X		X	X	X
OPR								
EPA	X	X	X	X			X	X
BLM								
COE								
National Park Service								
Fish and Wildlife Service	X	X		X	X	X		X

Oral Presentation at Public Meetings

Richard Spotts	X			X	X			
Gerald Schumacher								
Norman Sturm								
John Lawrence								
Lori Griggs		X	X			X		X
John Divito		X						
Laura King		X	X	X	X			
William Davoren		X				X		
David Okita		X				X		
Tom Graff		X	X	X		X		X
Frederick Bold			X					
Tom Torlakson		X	X	X		X	X	X

Table 1 (Continued)

COMMENTS AND ISSUES

	<u>Wetlands/ Habitat</u>	<u>Area of Origin</u>	<u>Seepage</u>	<u>Southern Delta</u>	<u>Recrea- tion</u>	<u>Levees/ X-Delta Flows</u>	<u>Friant New Melones</u>	<u>Support of COA</u>	<u>Changes to Draft EIS/R</u>
<u>Letters Received</u>									
Audubon	X							X	X
Lake Shasta Caverns					X				
Calif Waterfowl Assoc	X								
Com Water Pol Consensus	X			X			X	X	X
Def Wildlife	X							X	
Bay Inst SF	X								X
NRDC	X							X	
Sacto River Pres Trust	X							X	
California Trout	X						X		X
Yolo-Zamora WD		X							X
Sac Val West Canal Assoc		X							X
San Juan WD									X
South Delta WA				X					X
Colusa County WD		X							X
Santa Clara WD									X
CVP Water Association									X
North Delta WA/CCVFCA			X			X			X
CCC WA							X	X	X
North Calif Power							X		X
Trinity County	X				X				
Alameda County WD								X	
DFG (11-13)	X				X				X
DFG (10-29)								X	
Nat Am Hert Com									
SWRCB		X				X			X
OPR									
EPA								X	
BLM									
COE									
National Park Service									X
Fish and Wildlife Service	X			X	X	X			X
<u>Oral Presentation at Public Meetings</u>									
Richard Spotts	X							X	
Gerald Schumacher								X	
Norman Sturm								X	
John Lawrence								X	
Lori Griggs							X	X	
John Divito									
Laura King	X								
William Davoren	X								
David Okita							X		
Tom Graff	X								
Frederick Bold									
Tom Torlakson				X				X	

Section 1. GENERAL ISSUES

Review of written and oral comments on the Draft Environmental Impact Report/Statement showed the majority of these comments could be grouped into 16 general issues. An issue statement was developed for each general issue based on the actual comments received. The issue statements do not necessarily reflect the position of the Department of Water Resources or the Bureau of Reclamation on the issue. A response provided for each issue discusses the relationship to the Coordinated Operation Agreement and the Environmental Impact Report/Statement.

Comments requiring more specific detail or changes to the text of the draft report are presented in Section 2, Corrections and Additions.

Alternatives

Issue

The Coordinated Operation Agreement Draft Environmental Impact Statement/Report did not evaluate a reasonable array of alternatives, nor did it evaluate an optimum fish and wildlife protection alternative or worst-case scenario alternative.

Response

The Department and the Bureau recognize the requirement to evaluate a reasonable array of alternatives. The alternatives evaluated in the draft report were a reasonable array and included both an optimum fish and wildlife protection alternative and a worst-case scenario alternative.

Table S-1 summarized the six alternatives included in the draft report and

presented advantages and disadvantages of each. To optimize fish and wildlife concerns, two alternatives were considered. One is the preferred alternative, which includes adding about 100 separate water quality and flow protection criteria for the Delta environment. This alternative requires a commitment of about 2.3 million acre-feet of project critical period firm yield for environmental protection. Provisions to incorporate Suisun Marsh protective standards into the agreement are also included in the preferred alternative. Negotiations on a Suisun Marsh Preservation Agreement were concluded successfully in August 1985. Parties to the Marsh agreement include the Department of Water Resources, Department of Fish and Game, Bureau of Reclamation, and Suisun Resource Conservation District.

A modified agreement alternative, also included in the draft report, provided another option for fish and wildlife protection. This alternative included expanding the scope of the agreement using a draft article proposed by the U. S. Fish and Wildlife Service and presented at a negotiating session on July 14, 1982. This provision, which includes goals of fishery restoration and enhancement, was considered for some time by the negotiators but was not adopted. It was discussed on page 25 of the draft report, but was not included in the detailed analysis used for the preferred alternative.

Even though the article proposed by the Fish and Wildlife Service was not adopted, its idea of taking more action to protect fish and wildlife is included in State and Federal water resource planning that is separate from this Agreement. Examples include:

- ° Suisun Marsh protective planning.
- ° Use of \$5 million of State Water Project funds to improve the John E. Skinner Delta Fish Protective Facility.
- ° Negotiations between the Department of Water Resources and Department of Fish and Game to use several million dollars of State Water Project funds for additional fish protective measures to compensate for fish that would have been in the Delta if Banks Pumping Plant had not been constructed.
- ° Funding of interagency ecological studies that are identifying fish and wildlife needs in the Delta and San Francisco Bay; more than \$20 million has been contributed by the State Water Project and more than \$10 million by the Central Valley Project.
- ° Continued operation and improvement of fish hatcheries on the American, Feather, and Sacramento rivers.
- ° The Central Valley Fish and Wildlife Management Study to investigate water supply needs for Federal and State wildlife refuges in the Central Valley. The interagency team is now completing an appraisal-level study to identify problems and needs of the refuges. A 2-year planning study began in fiscal year 1986 to identify sources of water and the best plan for the refuges.

More discussion on measures for fish and wildlife protection in addition to the proposed agreement is included in the general issue on Decision 1485 standards.

Improved protection for fish and wildlife will be an objective for future Delta standards, and the Coordinated Operation Agreement has provisions for including future standards if adopted. Implementing the preferred alternative does not preclude adoption of standards that may broaden the scope of the

proposed agreement, nor does it preclude separate actions or agreements regarding water supply allocations to meet fish and wildlife needs in the Central Valley.

Analysis of the worst-case scenario demonstrated the potential temperature-related impacts to salmon upstream of the Delta (see pages 75 to 81 of the draft report). Operation studies used for the analysis included an assumption that maximized environmental differences between alternatives -- that the water both projects could save by meeting Tracy standards (no project) rather than Exhibit A standards (proposed action) would be retained in the reservoirs during critical years. This is not the most likely type of project operations, but it does represent a worst-case comparison. Implementation of the preferred alternative, even in light of this worst-case analysis, was judged not to have significant impacts and to provide improved environmental protection for the Delta. For more information on this worst-case analysis, see the general issue on salmon.

Reauthorization

Issue

The Coordinated Operation Agreement in effect reauthorizes the Central Valley Project, thus making water quality an authorized purpose of the project. This reauthorization should commit the Bureau of Reclamation to future standards as well.

Response

By executing the Coordinated Operation Agreement, the Secretary of the Interior will be agreeing to operate the Central Valley Project to meet water quality standards set forth in Exhibit A and to consider future standards pursuant to Article 11, which is discussed in more detail in the general issue on future

standards. The Coordinated Operation Agreement does not reauthorize the Central Valley Project. Consequently, it will not be executed on behalf of the Secretary of the Interior unless a statute is enacted authorizing the Secretary to execute and perform it.

Water quality standards in Exhibit A, taken from State Water Resources Control Board Water Right Decision 1485, are for the Sacramento-San Joaquin Delta. By authorizing the Secretary of the Interior to sign the Agreement, Congress will have permitted the Secretary to significantly increase authorized Central Valley Project operations for water quality, adding to previously authorized water quality operations of the New Melones Reservoir for the San Joaquin River.

Congressional actions defining authorized purposes of the Central Valley Project have evolved over the past 50 years. These actions have shown a continual responsiveness to the changing needs of water development in California. Important purposes such as fish and wildlife, recreation, and water quality have been incorporated, along with the initial purposes of river regulation, navigation, flood control, irrigation, and power. Article 11, for incorporating future standards into the Coordinated Operation Agreement, is consistent with previous actions developed to maintain long-term responsible operation of the project.

In addition to the many congressional actions that have specifically defined authorized purposes of the Central Valley Project, environmental protection laws continue to influence project development and operations. These laws pertain to both Federal and State projects. Laws such as the National Environmental Policy Act, California Environmental Quality Act, Endangered Species Act, Fish and Wildlife Coordination Act, and wilderness and wild river legislation directly

affect projects through mitigation requirements and, therefore, often influence project development and operation for environmental purposes.

Decision 1485 Standards

Issue

Although the Coordinated Operation Agreement commits both parties to standards equivalent to State Water Resources Control Board Decision 1485 Delta water quality standards (Exhibit A standards), these standards are inadequate environmental protection.

Response

The intent of the Coordinated Operation Agreement is to comply with, rather than to update, established standards for environmental protection. Exhibit A of the Agreement is the set of flow standards, water quality standards, and export restrictions that define the Delta portion of in-basin use requirements; it is taken from the Delta water quality and flow standards of Decision 1485.

The State Water Resources Control Board has established authority in connection with Decision 1485. The decision was an exercise of the Board's reserved jurisdiction to establish or revise terms and conditions for salinity control and protection of fish and wildlife and to coordinate the terms of the various permits for the two projects. The Board's authority to review and amend these permits is derived from Sections 100 and 1394 of the California Water Code, Section 763.5 of Title 23 of the California Administrative Code, and jurisdiction expressly reserved in previous permits.

Determination of the adequacy or inadequacy of Decision 1485 standards will involve comprehensive public hearings where testimony will be received from

numerous scientists, agencies, and other Delta interests. State Water Resources Control Board staff will evaluate the testimony and propose future standards for the Board's consideration. The Board will then use its authority to establish new standards. It would not be reasonable or possible for negotiators of the Coordinated Operation Agreement to bypass this process or the Board's authority. However, the Coordinated Operation Agreement provides a method to incorporate new standards once they are adopted.

Exhibit A standards are for protection of beneficial uses of water in the Sacramento-San Joaquin estuary, including municipal and industrial, agricultural, and fish and wildlife uses. These standards are based on the principle that water quality in the Delta should be at least as good as it would have been had State and Federal water projects not been constructed, as limited by the constitutional mandate of reasonable use. The State Board recognized that the standards might not achieve pre-project levels for some fish species, but deemed the level of protection reasonable until better ways could be found to mitigate project impacts.

Additional information is being gathered on Delta ecology, and the State Board will review the standards in connection with beneficial uses of Delta water supplies. On January 17, 1985, the State Board adopted Resolution 85-4, which contains a general schedule of actions to resolve outstanding water quality control and water rights issues relative to the Bay-Delta estuary. This schedule provides that the hearing process on these issues will begin in November 1986 (scoping) and a new plan finalized in 1989. This 3-year schedule is indicative of the complexity of the issues surrounding evaluation and revision of Delta standards. Also, this review process by the Board shows that establishing Delta standards involves a dynamic process and that all areas of concern must be regularly investigated.

This includes ongoing studies and monitoring. Protection for fish is one area, and this will include reviewing problems of toxic pollution. Providing protection against toxic pollution is beyond the operational capabilities of the projects.

Article 11 is included in the Agreement to deal with these future standards; the basis for its wording is discussed in response to the general issue on future standards. In the period before possible new standards, adoption of Exhibit A standards will provide greater protection for the Delta than without these standards.

Exhibit A standards provide more environmental protection than the Bureau's present water quality requirements, known as Tracy standards, by adding about 100 new protective criteria at 15 additional stations. There are several fishery benefits from Exhibit A, including:

- Joint commitment of about 2.3 million acre-feet of water supply for Delta outflow during critical water supply periods to meet Exhibit A standards for protection of the environment. This supply is removed from being a potential export source and will provide a benefit by eliminating the direct entrainment of fish at both the Federal and State Delta export facilities that could occur without a commitment to Exhibit A standards. The benefit will be for the many Delta fish species, including fish eggs, larvae, and food supply.
- Improvement of water quality conditions near the Antioch Water Works intake to benefit striped bass spawning.
- Added Delta outflow and quality at Chipps Island to benefit striped bass survival and salmon migration.
- Added Sacramento River flows at Rio Vista to benefit salmon migration.

- ° Diversion limitations in May, June, and July to minimize entrainment and to benefit young striped bass.
- ° Closure requirements for the Delta Cross Channel for certain conditions from mid-April through May to benefit striped bass by minimizing the number diverted into the central Delta.
- ° Improvement of several flow and quality conditions for agricultural, municipal, and industrial use, which indirectly provides fishery benefits.

These benefits will result from use of project supplies for environmental protection versus other options such as exporting the supplies. This change in use of supplies can result in changes in project operations.

In addition to the protective criteria contained in the Coordinated Operation Agreement, the associated commitment of water to the environment, and the ongoing review and monitoring process by the Board, there are numerous laws, policies, guidelines, physical measures, and studies designed to add to the environmental protection of the Delta. Many of the studies involve State Water Project and Central Valley Project funds to advance environmental protection measures above Exhibit A criteria. These additional measures are discussed below.

Federal and State laws and policies show that commitments to protect the environment are directly and indirectly in place to benefit the Delta. These include:

Federal Government --

- ° Fish and Wildlife Coordination Act
- ° National Environmental Policy Act of 1969

- ° Clean Water Act of 1977
- ° Endangered Species Act of 1973
- ° Land and Water Conservation Fund Act
- ° Principles and Standards for Planning Water and Related Land Resources
- ° U. S. Fish and Wildlife Service Guidelines for Review of Fish and Wildlife Aspects of Proposals In or Affecting Navigable Waters, December 1975
- ° Regulatory Programs of the U. S. Army Corps of Engineers
- ° Regulatory Program of the Environmental Protection Agency in Navigable Waters
- ° Concept Plan for Waterfowl Wintering Habitat Protection

State of California --

- ° Delta Protection Act
- ° Davis-Dolwig Act of 1961
- ° California Environmental Quality Act of 1970
- ° Fish and Game Code, Section 1600
- ° California Endangered Species Act of 1973
- ° Senate Concurrent Resolution No. 28, 1978
- ° Keene-Nejedly Wetlands Preservation Act of 1976
- ° Fisheries Restoration Act of 1985.
- ° California Fish and Wildlife Plan, 1966
- ° California Fish and Game Commission Resolution, February 9, 1973
- ° Department of Fish and Game Position on Delta and Suisun Marsh Wildlife Conservation by a Delta Water Facility, November 1975
- ° Resources Agency Policy for Preservation of Wetlands in Perpetuity, 1977

Many of the laws and policies are broad guidelines for protecting, among other things, fish and wildlife resources of the estuary system. These measures have been instrumental in guiding water resources planning and in defining mitigation responsibilities.

Facilities constructed and planned by the Department of Water Resources and Bureau of Reclamation to protect fish and wildlife provide specific types of benefits which are discussed below.

Reservoir Releases: To maintain flow requirements to protect fish and wildlife in the Delta, a portion of upstream reservoir storage must be reserved for releases to Delta outflow. Upstream releases from Oroville, Shasta, Clair Engle, Lewiston, and Folsom reservoirs required by the Coordinated Operation Agreement for protection of fish and wildlife resources have estimated values of about \$100 million to \$300 million if compared to the development of new supplies at \$100 to \$300 per acre-foot.

John E. Skinner Delta Fish Protective Facility: This \$5 million facility, recently enlarged at a cost of an additional \$4.5 million, is on the intake channel of Banks Pumping Plant, adjacent to Clifton Court Forebay. The facility screens and salvages fish from export water.

Tracy Fish Collecting Facilities: This \$3 million facility, constructed and operated by the Bureau of Reclamation, diverts and collects fish from the intake channel to Tracy Pumping Plant. It was developed through an exploratory program conducted jointly by the Bureau and the Fish and Wildlife Service. This facility is part of the Central Valley Project.

Hatcheries: Although outside the boundaries of the Delta, several State and Federal hatcheries contribute to fish populations in the Sacramento-San Joaquin river system and help protect anadromous fish within the Delta. Major hatchery facilities are Nimbus Hatchery on the American River, Feather River Hatchery, and Coleman National Fish Hatchery on Bottle Creek (a tributary to the upper Sacramento River). Smaller facilities include Tehama-Colusa Fish Facility on Coyote Creek, Mokelumne

River Fish Installation, Elk Grove Fish Hatchery, and Merced River Fish Facility.

Old River Closure: During the fall of drier years, a reach of the San Joaquin River near Stockton sometimes becomes depleted of dissolved oxygen due to low inflow and the decomposition of waste materials discharged into the river. The shortage of dissolved oxygen blocks upstream migration of adult salmon. When this occurs, the Department of Water Resources constructs a temporary rock barrier across the head of Old River in the southern Delta, forcing more water into the San Joaquin River to remove the dissolved oxygen block. Each time the barrier is placed and removed, it costs the Department about \$50,000. The Department of Fish and Game has determined this closure to be effective in reducing stress to migrating salmon.

Protection requires knowledge of the Delta's environment including studies and monitoring. Studies for Delta protection have ranged from individual studies of species to broad conservation plans. The Department of Water Resources and U. S. Bureau of Reclamation have provided significant funding for these studies, which have added and will continue to add to protection for the Delta. A tremendous amount of information has been gained, but it is not yet known how all the individual pieces of information interact. The ecological investigations of the Delta have faced several unique conditions, including the many complex factors that affect the Bay-Delta estuary:

- ° Land reclamation.
- ° Waste water effluent and surface runoff from local and upstream urban development.
- ° Oil spills.
- ° Drainage and leaching water discharge from Delta and upstream agricultural use, including drainage from San Joaquin Valley.
- ° Commercial, sport, and illegal fishing.

- Construction and maintenance of deep water ship channels.
- Use of natural inflows by upstream agricultural and urban development.
- Upstream storage and regulation of natural inflows by more than 500 reservoirs, including those of the Central Valley Project, State Water Project, Hetch Hetchy Aqueduct Project, Mokelumne Aqueduct Project, and local projects.
- Diversions by the Central Valley Project, State Water Project, local municipal and industrial users, and Delta agricultural water users.
- Levee failures.

Ecological studies will advance knowledge on how factors such as those listed above affect the Delta and identify measures that can be taken to reduce the impacts of these factors.

Recent and ongoing studies are discussed below.

Interagency Ecological Study Program: These are cooperative studies by the Department of Fish and Game, Department of Water Resources, U. S. Fish and Wildlife Service, U. S. Bureau of Reclamation, U. S. Geological Survey, and State Water Resources Control Board. (These studies were mentioned in the response to the general issue on the striped bass decline.) They are for the purpose of obtaining a thorough understanding of the estuary in order to:

- Gain insight into fish and wildlife requirements in the Bay-Delta system.
- Develop design and operating criteria for the State Water Project and Central Valley Project for protection and enhancement of fish and wildlife.
- Monitor project operations and modify operating criteria as necessary.

Total funding under the program has been over \$40,000,000 from 1971 through June 30, 1984, which has been shared among three agencies approximately as

follows: Department of Water Resources, \$20,000,000; Department of Fish and Game, \$13,000,000; and U. S. Bureau of Reclamation, \$9,000,000.

The interagency program consists of five study elements: fisheries, water quality, fish facilities, Suisun Marsh, and San Francisco Bay. The study elements are described briefly below.

- Fisheries. Examines the environmental requirements of chinook salmon, striped bass, and resident fish such as white catfish and largemouth bass and the impact of water projects on these requirements. Field sampling is used to index abundance, and these indices are compared to variables such as flow, pumping, food supply, temperature, and toxicants to determine what variables control population size.
- Water Quality. Examines factors controlling abundance and distribution of floating algae in the Delta and Suisun Bay. These microscopic plants form the basis of most food chains in the aquatic environment. The study also collects data on zooplankton, the small animals that graze on the algae.
- Fish Facilities. Develops information needed to build effective fish protective systems in the Delta and elsewhere and to evaluate the effectiveness of existing facilities.
- Suisun Marsh. Develops physical facilities that allow use of available water for maintaining duck habitat in the marsh. Evaluates effectiveness of the facilities for meeting the objectives.
- San Francisco Bay. Two major elements, biological and hydrodynamic, provide information regarding effects of freshwater flow on distribution and abundance of fish and identify circulation patterns in the lower estuary.

In addition to the Interagency studies, other ecological studies and monitoring have been or are being conducted to advance knowledge of the Bay. These are discussed below.

- Cooperative Striped Bass Study: This study, funded by the State Water Resources Control Board, investigated relationships between toxic materials in San Francisco Bay and Delta waters and problems with the striped bass population. The study was conducted by the National Marine Fisheries Service in cooperation with the Department of Fish and Game.
- Striped Bass Stamp Fund: The Department of Fish and Game manages studies funded by striped bass stamp monies and coordinates the striped bass artificial propagation program.
- Aquatic Habitat Program: The goals of this program, administered by the San Francisco Bay Regional Water Quality Control Board, are to (1) evaluate present and future effects of pollutants on beneficial uses in San Francisco Bay and the Delta, and (2) determine possible ways to achieve a more centralized direction of all water-related Bay studies, including general research. Bond monies budgeted are in excess of \$600,000.
- Related State Water Resources Control Board Activities: The Pollutant Investigations Branch monitors and studies toxics in the estuary. San Francisco Bay Regional Water Quality Control Board has several studies, including nonpoint source loadings in South Bay, Napa River bacteriological study, and San Francisco Bay shellfish harvesting.
- At the request of the State Water Resources Control Board, a group of scientists investigated causes of the striped bass decline to identify corrective action. The group's recommendations have resulted in the

Export Curtailment Experiment, which is aimed at (1) determining the effects of State Water Project and Central Valley Project exports on food chain (phytoplankton and zooplankton) development and abundance during larval stages of striped bass in the estuary and (2) determining the relative importance of these effects in comparison to other factors affecting the food chain.

- Water Right Decision 1485 requires monitoring Delta conditions to ensure that flow and quality standards established by the State Water Resources Control Board for environmental protection are met. Monitoring is closely coordinated with the Interagency Ecological Study Program. Funds for 1984-85, provided by the State Water Project contractors, are in excess of \$1.9 million.

Future Standards/ Termination Provisions

Issue

The Coordinated Operation Agreement does not commit the Bureau of Reclamation to any new or revised standards. The Environmental Impact Statement/Report should address the requirement for the Bureau of Reclamation to meet current and future Delta water quality standards under Section 313 of the Clean Water Act. Also, the Coordinated Operation Agreement is of limited duration because of all the termination provisions.

Response

Commitment by the Bureau of Reclamation to any new or revised standards is an important and complex issue. During the long negotiations for this proposed agreement this issue was resolved by development of agreement provisions to meet three objectives.

1. A guarantee that existing standards be implemented by both projects.
2. A defined procedure to include future standards.
3. Maintenance of legal neutrality with the 1978 U. S. Supreme Court decision California vs. United States.

Article 11 of the Agreement meets the above objectives and provides a practical approach to eliminating a potential impasse in negotiations.

Article 11 requires the Bureau of Reclamation to operate the Central Valley Project to meet Exhibit A standards and allows the Secretary of the Interior to accommodate a future change in water quality standards through amendment of Exhibit A without renegotiation of other provisions of the Coordinated Operation Agreement. Under the provisions of Article 11, if new standards are adopted, Federal decision-makers will determine whether operation of the Central Valley Project in conformity with the new standards is consistent with congressional directives. If so, Exhibit A of the Agreement will be amended to conform with the new standards. If not, the Bureau of Reclamation will promptly request that the Department of Justice bring a legal action to determine whether the new Delta standards should be considered binding on the Central Valley Project.

Article 11 does not require the Secretary to unconditionally accommodate all future changes in such standards because the 1978 U. S. Supreme Court decision California vs. U. S., 438U.S.645, holds that the Central Valley Project must be operated to meet only those conditions contained in its water right permits that are not inconsistent with congressional

directives. Recognition of that decision is incorporated in Article 11 of the Coordinated Operation Agreement and is not inconsistent with Section 313 of the Clean Water Act.

The Bureau of Reclamation and the State of California realized that more specific provisions regarding applicability to the Central Valley Project of water quality standards other than those in Exhibit A could not be incorporated without an ability to foretell the scope and details of future actions by the State Water Resources Control Board. Accordingly, Article 11 requires the Bureau of Reclamation to evaluate impacts of any new State standards through additional operation studies and to determine whether those new standards are consistent or inconsistent with congressional authorization of the Central Valley Project.

If the State Water Resources Control Board adopts new standards and Exhibit A is not amended, the Central Valley Project will continue to be operated to comply with the Exhibit A standards.

The Coordinated Operation Agreement was designed to bind both the State and Federal projects to coordinated operation in perpetuity. Flexibility to amend the agreement, where necessitated by changed circumstances such as the construction of additional facilities (built into Article 14) and future standards (built into Article 11) is included. This flexibility was provided for the specific purpose of maintaining agreement even when inevitable changes occur in the water supply and operations picture. Provisions allow for termination (Article 14(b)(1) and (2)) if:

- ° A contract for the purchase and conveyance of water is not agreed to by December 31, 1988 (Article 10(h)(1));

- ° Amendments to water right permits are not received (Article 10(h)((4)); or
- ° After periodic review, the parties fail to reach agreement on revisions.

The possibility of termination of the Coordinated Operation Agreement within 5 years arises in the context of subarticles 10(h) and 14(b). However, a significant incentive is future water resources planning needs for both the Central Valley Project and the State Water Project that could be met in part by successful negotiations between the Bureau of Reclamation and the Department of Water Resources for an agreement on purchase and conveyance of the Central Valley Project water pursuant to subarticle 10(h).

Both agencies must subsequently work with the State Water Resources Control Board to obtain permits required to implement such an agreement. These project demands are important enough to each agency to ensure that good faith efforts will be applied to negotiating an agreement under subarticle 10(h) rather than terminating the Coordinated Operation Agreement for failure to reach such an agreement. Moreover, the termination provision in subarticle 14(b) is optional, not mandatory. Thus, even if the agencies fail to reach agreement on the contract provided for in subarticle 10(h), they may have crucial policy concerns that will make it more expedient to continue coordinated operation rather than terminate the Agreement.

With the Agreement in place, priority is given to Delta environmental protection, including water quality control. This priority is an intent of the Agreement, and no provision in the Agreement alters this intent.

Article 14 provides for review of project operations every 5 years, or

more frequently if requested by either party. The Bureau and the State have spent at least 25 years conducting joint operation studies and negotiating an agreement to provide for coordinated operations because it is to their mutual advantage to have such an agreement. Subarticle 14(b) provides for an advisory board to assist when there is extreme disagreement on changes to the Coordinated Operation Agreement specifically because both parties want to maintain the agreement finally negotiated. Given the history of these efforts, it is unlikely that either party would casually seek to terminate the Coordinated Operation Agreement. Both parties recognize the necessity of coordinated operation to the projects and to overall public interest.

Future Water Marketing

Issue

The Coordinated Operation Agreement will end the Bureau of Reclamation moratorium on additional water contracts. The Draft Environmental Impact Statement/ Report failed to fully address the incremental or cumulative impacts of future water marketing.

Response

The Coordinated Operation Agreement does not authorize new water delivery contracts. The Agreement does require that both the State Water Project and the Central Valley Project commit about 2.3 million acre-feet of water during a critical water supply period to provide environmental protection. This supply is removed from any potential future water supply contract. However, separate from the Agreement, the Bureau of Reclamation is planning for future marketing of water. Any future contract will require new agreements separate from the Coordinated Operation Agreement and will require the Bureau of

Reclamation to meet all requirements of governing policy and law. Both Bureau of Reclamation policy and Federal law require that environmental concerns be appropriately addressed before new contracts are executed. Meeting the water quality standards identified in the Coordinated Operation Agreement is a major action being taken by the Bureau of Reclamation to satisfy a significant aspect of Delta environmental protection.

The Bureau of Reclamation is preparing environmental impact statements on future water marketing for the Central Valley Project. Analyses in these documents will include site-specific discussions of impacts within each marketing area and cumulative impacts that result from the incremental impacts of marketing water when added to past, present, and foreseeable future actions projectwide. The depth of the analysis and the range of alternatives selected for analysis will vary depending on marketing demands and the issues identified as significant by the public, the Bureau, and other affected agencies during the scoping process. These issues may include an analysis of surface water and ground water quality, soil salinity and toxicity, subsidence, fish and wildlife (including water supplies for refuges), endangered species, floodplains and wetlands, drainage, seepage and streambank erosion, recreation, cultural resources, land use changes resulting from water marketing, socioeconomic factors, and power production.

Planning for future Central Valley Project water supply contracts was addressed on pages 94 to 100 of the draft report (see sections on Cumulative and Growth Inducing Impacts; Wheeling Arrangements; Purchase of Central Valley Project Water by the State Water Project; Removal of the Moratorium on New Water Service Contracts; Mitigation Measures for Cumulative Impacts; and Table 15, Expected Environmental Effects of Possible Future Actions). These

discussions of future water marketing are more general than what is expected for future environmental reports on this matter, since the exact nature of future contract amounts and locations cannot be predicted.

Salmon

Issue

The Coordinated Operation Agreement will cause temperature problems (and related salmon problems) in the Trinity and Sacramento rivers and flow problems in the American and San Joaquin rivers. These impacts were not addressed sufficiently, and no mitigation was included.

Response

Potential changes in river temperatures resulting from changes in project operations, and associated effects on salmon spawning, are an important concern. The draft report acknowledged the importance of such changes and provided a detailed analysis of potential temperature changes attributable to the Agreement. Potential salmon impacts presented in the draft report for the proposed action represent incremental mortalities based on a worst-case analysis designed to maximize impacts. These impacts are not "actual" impacts, nor are they likely to occur as presented. This type of analysis is consistent with the needs of an environmental assessment. However, interpretation of worst-case results should recognize the probability of occurrence by comparison to actual conditions. A review of the worst-case evaluation by comparison to actual operations, along with consideration of the provisions for salmon protection in the Agreement, led to the judgment that impacts to salmon would not be significant.

The comparison and findings for this Agreement do not imply that temperature

control for fish protection in the Sacramento and Trinity rivers is unimportant. Separate studies are reviewing protective measures for this concern. Also, this impact evaluation does not imply that trading upstream habitat for Delta habitat is a strategy of the Coordinated Operation Agreement. The Agreement was developed to provide a reliable and mutually acceptable basis for coordinating operations while protecting the water-related environment of the Delta.

The analysis in the report used an assumed condition in which the difference in flow between meeting Tracy standards and Exhibit A standards is retained in upstream reservoirs and thereby allowed better temperature control without the proposed Agreement. The result was that some incremental temperature increases were associated with the Agreement. The probability of occurrence of this worst-case is very low, since it assumes that about 2 million acre-feet of water in upstream reservoirs would be left completely unused through a critical water supply period if it were not used for Delta protection as defined in the Agreement. This would occur concurrent with statewide water shortages.

This worst-case scenario for the Agreement showed that temperature changes could occur in less than 4 percent of the years studied. This change could cause a 4 percent total salmon run loss with present conditions and 8 percent in 2020. Reducing the capability of the Central Valley Project to control water temperatures for salmon spawning in the rivers below its major reservoirs during critical years is a potential adverse environmental impact (discussed in detail on pages 74 to 77 of the draft report). To the extent that Decision 1485 standards protect these resources, meeting these standards is judged more beneficial to the environment than not meeting them. If any of the supply that was assumed to be retained in storage were released under actual conditions,

then any incremental differences in temperature would be reduced. If all the supply were used, then the impact differential between no-project and worst-case would be eliminated, and any impacts associated with the Agreement would also be eliminated. Comparison, actual conditions during the 1976-1977 drought were used to represent critical conditions.

Evaluation of actual conditions during the drought revealed the following.

- Water supplies were not retained in reservoir storage as assumed for the worst-case analysis in the draft report. Delta emergency standards were in effect and required less storage than Exhibit A standards.
- Actual temperatures considered lethal to salmon (above 60°F) did occur in upstream spawning areas during July through September. These temperatures occurred without the present agreement and approach or equal conditions similar to the worst-case increases predicted for the Agreement. This suggests that such conditions may occur with or without the Agreement. Coordinated operation of the State Water Project and Central Valley Project reduced these temperature impacts considerably during October through January.
- Salmon returns 3 years after the 1976-1977 drought showed no significant reductions in population numbers. Commercial catch values actually increased in the 1979 to 1980 post-drought period. These returns were based on 1979 and 1980 commercial catch and escapement records.

Based on this comparison and the facts listed below, the potential impacts to salmon were determined not to be significant.

- Temperature increases from using available stored water during a drought will probably occur without

the Agreement and are largely independent of the Agreement.

- Limited temperature increases above 60°F that occurred in 1976 and 1977 did not appear to substantially impact salmon runs.
- Provisions for salmon protection in the Agreement include maintenance of flows in the Sacramento River at Rio Vista for salmon migration. Also, the Agreement includes export restrictions.

Striped Bass Decline

Issue

Striped bass populations have continued to decline with Decision 1485 standards, as demonstrated by recent striped bass index calculations, yet the Coordinated Operation Agreement neglects to commit the Bureau of Reclamation or the Department of Water Resources to any standards that provide greater protection than Exhibit A. Also, the Draft Environmental Impact Statement/Report does not discuss striped bass index calculations.

Response

The Department of Water Resources and the Bureau of Reclamation recognize striped bass and other fish species to be a valuable State resource and, along with other agencies, have programs in place to resolve this problem. However, specific changes to Decision 1485, if any, needed to reverse the striped bass decline are not yet known. Decision 1485 standards only relate to factors involving water project operations. Factors other than project operations, such as toxics and other pollution, may be contributing to the recent striped bass decline.

To the extent that established Decision 1485 standards protect striped bass from effects due to project operations,

Exhibit A standards will afford the same level of protection. Effects due to other factors are under investigation. Both agencies have taken steps, along with others, to reverse the decline and to improve methods to predict populations. These steps include commitments in connection with the Coordinated Operation Agreement. Also, studies by other agencies, physical measures, laws, policies, and guidelines are protective measures that go beyond the protection included in Exhibit A. These other measures are discussed in the response to the general issue on Decision 1485 standards.

Commitments in the Coordinated Operation Agreement were discussed in the draft report. Key points include the commitment of 2.3 million acre-feet of project yield during a critical water supply period for outflow to meet about 100 separate environmental protection criteria for the Delta taken from Water Right Decision 1485. Decision 1485 criteria for striped bass protection include:

- Electrical conductivity requirements at Prisoners Point and at the Antioch Water Works intake on the San Joaquin River.
- Minimum Delta outflow requirements from January through July.
- Curtailment of State Water Project and Central Valley Project exports in May, June, and July of all year types.
- Constraints on operation of the Delta Cross Channel gates in April and May to minimize diversion of young striped bass into the central Delta.

Although changes to these criteria may be needed, meeting these standards is better than not meeting them and this is an added commitment beyond the no-action alternative.

In August 1981, the State Water Resources Control Board published a Prehearing Staff Report, Triennial

Review of the Water Quality Control Plan to provide a review of the plan and Decision 1485 standards, as required by law. During this review, the Department of Fish and Game submitted information and recommendations regarding the striped bass decline. Fish and Game indicated that the decline "may be related to causes other than Delta operation of the Central Valley Project and State Water Project or the current Delta Plan striped bass survival standards". Fish and Game further suggested that factors other than outflow and diversions in spring and summer are directly responsible for the decline in abundance of juvenile striped bass.

The more recent Striped Bass Working Group study focused specifically on striped bass. At the request of the State Water Resources Control Board, a group of scientists investigated causes of the striped bass decline to identify corrective action. Four possible causes were examined:

- ° Production of food for young striped bass has been reduced.
- ° Large numbers of eggs and young bass are diverted from the estuary with water needed for agriculture, power plant cooling, and other uses.
- ° Point and nonpoint discharges of pesticides and petroleum products may increase mortality of adults, reduce their ability to reproduce, or reduce the survival of eggs and young.
- ° The adult population, reduced by a combination of declining numbers of juveniles and higher mortality rates, produces fewer eggs.

Although no conclusions have been reached, the group's recommendations have resulted in an interagency flow management experiment to determine:

- ° The effects of State Water Project and Central Valley Project exports on food

chain (phytoplankton and zooplankton) development and abundance during larval stages of striped bass in the estuary.

- ° The relative importance of these effects in comparison to other factors affecting the food chain.

Information obtained has not yet led to conclusions.

Commitments by the Department of Water Resources and Bureau of Reclamation beyond those in the Coordinated Operation Agreement include funding a significant portion of the \$40 million spent to date on the Interagency Ecological Study Program. These cooperative studies by the Department of Fish and Game, Department of Water Resources, U. S. Fish and Wildlife Service, U. S. Bureau of Reclamation, U. S. Geological Survey, and State Water Resources Control Board are for the purpose of obtaining a thorough understanding of the estuary in order to:

- ° Gain insight into fish and wildlife requirements in the Bay-Delta system.
- ° Develop design and operating criteria for the State Water Project and Central Valley Project for protection and enhancement of fish and wildlife.
- ° Monitor project operations and modify operating criteria as necessary.

In addition, the Department of Water Resources is negotiating with the Department of Fish and Game to obtain an agreement for operation of Banks Pumping Plant. This agreement is expected to provide several million dollars for fish protective measures to compensate for fish that would have been in the Delta had the pumping plant not been constructed.

The striped bass index is a correlation between historical records of young striped bass populations, Delta outflows, and project exports. This index

has been discussed in connection with two different topics: (1) an actual yearly measurement of young striped bass in the Delta; and (2) in relation to a statistical relationship between outflows and exports from operation studies that simulate future levels of development. The first use of the index is still valid, and information concerning 1985 findings has been added to this final report. Uncertainties have developed in the area of the second topic because predicted values have been considerably higher than actual values since the 1976-1977 drought. Use of the correlation for future conditions in this environmental document would probably overpredict the index. Work is underway to revise this correlation.

Suisun Marsh

Issue

No protection for Suisun Marsh is provided for in the Coordinated Operation Agreement, and impacts to the marsh have not been adequately addressed in the Draft Environmental Impact Statement/Report.

Response

Protection for Suisun Marsh is an integral part of water resources planning and is the subject of a separate agreement between the Bureau of Reclamation, Department of Water Resources, Department of Fish and Game, and Suisun Resource Conservation District. For this reason, the Coordinated Operation Agreement included only some of the Suisun Marsh standards from Decision 1485.

However, the Coordinated Operation Agreement was specifically designed to include the finalized Suisun Marsh protective measures defined by this separate action. The Agreement has provisions for amendments to integrate such new marsh protective facilities (Articles 14 and 16). Water quality

standards pertaining to Suisun Marsh would be amended into Exhibit A, and any adjustments necessary to the sharing formula and Exhibit B would be made in accordance with Articles 11 and 6, respectively.

Progress has been made toward protecting the marsh. Physical facilities are required because protection of the marsh with outflow alone during dry periods would require excessive quantities of water and would likely be considered a waste of water under the California Constitution and the California Water Code. Three of the facilities needed to protect water quality in Suisun Marsh have already been constructed: Morrow Island Distribution System, Goodyear Slough Outfall, and Roaring River Slough intake. These were constructed with project funds at a cost of \$10 million. Construction of the Montezuma Slough Control Structure is to begin in June 1986; completion is scheduled for fall 1988. This facility is expected to protect about 80 percent of the marsh and has a projected cost of about \$20 million. The need for additional facilities will be determined by examining effects on water quality of operating these facilities. The cost for additional facilities may increase total costs to \$120 million.

Legislation is required to authorize the Secretary of the Interior to financially participate in construction of facilities contemplated by the 4-party agreement negotiated in August 1985. This legislation could be passed concurrent with or as part of legislation authorizing the Coordinated Operation Agreement.

The primary objective of the Suisun Marsh Preservation Agreement is to assure a dependable water supply to mitigate adverse effects by the Central Valley Project and State Water Project and a portion of the adverse effects of other upstream diversions. This will be accomplished by implementing the plan of protection, including construction of facilities.

The agreement defines water quality standards that in most years are similar to those provided under Decision 1485, except the agreement provides for relaxation of the standards in a series of dry or critical years. The parties to the agreement are to jointly petition the State Water Resources Control Board to substitute the agreement for the marsh standards in the Central Valley Project and State Water Project water right permits.

The agreement defines a schedule and sequence of construction for facilities of the plan of protection. It provides for test periods during which the effectiveness of facilities constructed to date is to be evaluated. Assessments will then be made to determine if additional facilities will be needed to meet the water quality standards of the agreement.

The Bureau of Reclamation is to pay 40 percent of the costs of the facilities, including operation and maintenance, with a Federal construction cost ceiling of \$50 million in 1985 dollars. The Department of Water Resources will pay the balance, 40 percent paid by the State Water Project and 20 percent from funds appropriated by the Legislature for impacts caused by other upstream diverters. Neither agency will be liable for the other's obligations under the agreement.

Two additional subsidiary agreements between the Bureau of Reclamation, the Department of Water Resources, and the Department of Fish and Game are involved. One covers soil salinity and channel water quality monitoring, and the other provides for the acquisition and development of lands to mitigate for impacts of constructing the Suisun Marsh facilities and for impacts on the channel islands that cannot be served by facilities. The cost of both functions will be shared on the same basis.

The monitoring agreement for Suisun Marsh is between the U. S. Bureau of Reclamation, Department of Water

Resources, and Department of Fish and Game. The objective is to establish methodology for the monitoring program to carry out objectives of the Suisun Marsh Preservation Agreement. Fish habitat studies will be funded through the Interagency Ecological Study Program. Every 5 years the program will be reviewed to see if it can be reduced. Soil salinity monitoring will be discontinued after September 30, 1990.

The mitigation agreement for Suisun Marsh is between the same parties as the monitoring agreement. The objective of this agreement is to mitigate for wetlands lost because of facilities constructed in accordance with the Suisun Marsh Preservation Agreement and due to the impact of the Central Valley Project and State Water Project and other upstream diverters on the channel islands. At first, the Department of Fish and Game will be given about \$3 million by the Department of Water Resources and the Bureau of Reclamation to acquire, develop, and operate lands to compensate for impacts of the Initial Facilities, the Montezuma Slough Control Structure, and half the impacts on the channel islands. When additional facilities are to be constructed, additional mitigation land funding will be provided. By September 30, 1997, the second half of the funding for channel island impacts will be furnished.

San Francisco Bay

Issue

The Coordinated Operation Agreement provides no protection for San Francisco Bay, and impacts to the Bay were not adequately addressed in the Draft Environmental Impact Statement/Report.

Response

San Francisco Bay, a valuable resource, has been the subject of intensive ecological research for many years. Many complex physical, chemical, and biologi-

cal components interact in San Francisco Bay. The Department of Water Resources, the Bureau of Reclamation, and others are working toward a better understanding of how water projects; point discharges, surface runoff, and other toxic pollution sources; land reclamation; and commercial fishing influence the estuary. Various reports have been printed describing preliminary findings. When the State Water Resources Control Board developed and issued Water Right Decision 1485, insufficient information precluded the Board from adopting specific standards for the Bay. Protective Exhibit A standards in the Coordinated Operation Agreement are taken from the established Decision 1485 standards.

Exhibit A standards in the Coordinated Operation Agreement require higher outflow during dry and critical years than is required under the Tracy standards, and this higher outflow may indirectly protect the Bay. (See the general issue on Decision 1485 standards for further discussion of Exhibit A standards versus Tracy standards.) The Coordinated Operation Agreement will assure this level of protection in the future, thereby guaranteeing increased outflows. Operating both projects to meet these standards will commit 2.3 million acre-feet of firm project yield during a critical water supply period. Future standards updating those in Decision 1485 may include protective standards for the Bay. Article 11 of the Agreement provides a method for new standards to be incorporated into the Agreement (see the general issues on Decision 1485 standards and future standards).

Although Decision 1485 did not establish specific outflow standards for San Francisco Bay, the State Water Resources Control Board emphasized that consideration must be given to outflow needs of the Bay. The Board has developed interim policy guidelines regarding unregulated flows to be used in planning future projects. In an effort to advance knowledge of and protection for the Bay, investigations of the

health and needs of the Bay are continuing.

Studies for the Bay that include funding by the Department of Water Resources and the Bureau of Reclamation are part of the Interagency Ecological Studies Program. These studies are primarily outflow related; other investigations discussed later address toxics. The Interagency Ecological Studies are to answer questions on how operation of the State and Federal projects may relate to other factors and other water development to affect the Bay. Studies are underway to:

- ° Determine effects of changes in freshwater flow on biota of San Francisco Bay, with emphasis on fish and shrimp populations.
- ° Determine effects of freshwater flow on estuarine hydrodynamics, including velocity distribution, mixing, particle transport, and salinity gradients.
- ° Determine effects of outflow-related changes in hydrodynamics on San Francisco Bay biota.

Although no definitive conclusions have yet been reached from the interagency studies, understanding of some processes and relationships has advanced. A report that discusses this investigation is Effects of Freshwater Outflow on the San Francisco Bay, a joint report by the Department of Fish and Game, Department of Water Resources, U. S. Bureau of Reclamation, U. S. Geological Survey, U. S. Fish and Wildlife Service, and the State Water Resources Control Board. This report analyzes literature on estuaries, including hydrology and toxology interrelationships. It contains a bibliography of over 100 reports related to this subject. Other reports that discuss the Bay include:

- ° San Francisco Bay: The Urbanized Estuary, T. J. Conomos, Ed. (American Association for the Advancement of Science, 1979).

- ° San Francisco Bay: Use and Protection, W. J. Kockelman, T. J. Conomos, A. E. Leviton, Eds. (American Association for the Advancement of Science, 1982).
- ° Toxicants in San Francisco Bay and Estuary, R. W. Risebrough, J. W. Chapman, R. K. Okazaki, T. T. Schmidt (Association of Bay Area Governments, 1978).
- ° The Modification of an Estuary, F. H. Nichols, J. E. Cloern, S. N. Luoma, D. H. Peterson (Science, Vol. 231, 1986).

In a March 1986 report by the Bay Area Dischargers Association by William J. (BJ) Miller, entitled The State of San Francisco Bay, historical trends in Bay water quality pollution patterns and key Bay fish and wildlife species abundance is reviewed. This report also discusses such issues as toxics, Delta outflow, and the possible effects of surface runoff on Bay water quality.

The reports vary in presentation of material, and the following discussion is not a representative summary of those reports. Various topics of investigation for the Bay are discussed below.

Circulation/Outflow. Bay circulation is driven by three main factors: tides, freshwater flow-induced estuarine circulation, and wind-induced mixing.

Most water motion in the Bay is the result of tides. Filling and diking over the years have decreased the volume of the tidal prism (volume of water entering the Bay between low and high tide), which in turn has decreased tidal flushing of the Bay. The average volume of water passing the Golden Gate during a single flood or ebb tide is about 1.1 million acre-feet, about 20 percent of the total volume of the Bay. About 24 percent of this tidal prism (5 percent of Bay volume) is replaced by new ocean water during each tidal cycle.

Estuarine circulation created by inflow from the Sacramento River system is also being studied as a factor affecting net transport into and out of the Bay. Estuarine circulation is driven by the difference in density between fresh water and salt water, which is related to Delta outflow. The importance of estuarine circulation and its association with the effect of winter storms on salinity distribution in the southern reaches of the Bay are being investigated in connection with flushing the South Bay.

Delta outflow provides large amounts of suspended sediments and nutrients, which contribute to the ecological balance of the Bay. Drainage from Delta and valley agriculture is present in Delta outflow.

Surface Runoff. The B. J. Miller report, The State of San Francisco Bay states that surface runoff in the San Francisco Bay basin is primarily due to rainfall. Surface runoff constitutes large quantities of suspended solids, heavy metals, and organics, which may affect organisms and habitat year round.

Although in 1978 surface runoff represented less than 4 percent of the total inflow to San Francisco Bay, it accounted for an estimated 25 percent of the total suspended solids and over 35 percent of the heavy metal input to the Bay.

Identified adverse effects of surface runoff include bacterial pollution and shellfish contamination, and when stream runoff causes sewers to overflow, odor and other problems may also ensue.

Toxics. The Citizens for a Better Environment Report, Toxics in the Bay: An Assessment of the Discharge of Toxic Pollutants to San Francisco Bay by Municipal and Industrial Point Sources (1983) states that industrial plants and sewage treatment plants annually discharge waste water containing about

11 million pounds of oil and grease and about 900,000 pounds of toxic pollutants into the Bay.

Toxic pollutants to the Bay include heavy metals (cadmium, lead, zinc, chromium, copper, mercury, nickel, and silver), cyanides, arsenic, and organic chemicals (oil, phenols, solvents, pesticides, PCBs, and others). Properties of these substances that make them inherently hazardous in an estuarine environment include persistence and mobility in the environment, the ability to bioaccumulate and build to high concentrations in the food web, and acute and chronic toxicity to estuarine organisms and wildlife.

Bioaccumulation of toxic pollutants has been detected in striped bass, in mussels and other shellfish, and in harbor seals taken from the Bay. Scientists at the National Marine Fisheries Service have studied a possible relationship between adverse reproductive effects on striped bass and toxic pollutants present in striped bass tissue.

Trends in Resource Levels. During the past century, Bay resources have been impacted by land reclamation, dredging, water development projects, water pollution, and over-fishing. Many of the commercial fisheries began to decline before the turn of the century.

Primary declining resources in the Bay are the dungeness crab, striped bass, and white sturgeon. The crab decline was closely correlated with persistent changes in ocean conditions that began 3 years before the initial decline. No single factor has surfaced as the major cause of the striped bass decline. Declining phytoplankton production, Delta water diversion projects, toxicants, and reduced egg production have been hypothesized as possible causes, singly or cumulatively. Fluctuating population levels of white sturgeon have been attributed to poor recruitment during the mid-1950s. Three causes of

poor recruitment have been suggested: degradation of habitat for juveniles due to reduced freshwater flows, toxicant contamination, and declines in spawning stock size.

Some resources are contaminated. Until recently, the Department of Health Services has not allowed shellfish to be harvested for human consumption due to contamination of the Bay shoreline by sewage and other material. Recent improvements in waste water discharges have allowed selected shellfish beds to be opened on a temporary basis.

Although there have been decreases in some species several species have shown an increase in resource levels. Three of these are introduced species: the Korean shrimp, an important forage species; the Japanese littleneck clam, important in the diet of some sport fish; and the yellowfin goby, one of the most common species in the Bay and Delta.

Although knowledge of factors regulating Bay resource levels continues to grow, considerable work remains. Such work is beyond the scope of the Coordinated Operation Agreement, as it pertains to the effects of meeting existing standards. As more knowledge is gained and as these standards change, including possible addition of Bay protective standards, vehicles exist that allow these new protective standards to be incorporated into the Agreement.

Wetlands and Habitat in the Central Valley

Issue

The Coordinated Operation Agreement could foreclose opportunities to secure a firm supply of Central Valley Project water for Federal and State wetland areas in the Central Valley because it will provide for future water supply contracts.

Response

Implementation of the Coordinated Operation Agreement will not prohibit allocation of Central Valley Project water supplies to wetlands.

The Coordinated Operation Agreement does not obligate project water supplies to any use except Delta water quality and fish protection. Any future water supply contract requires action beyond this Agreement and must comply with the usual contracting and environmental review process. This is discussed in more detail in response to the general issue on future water marketing.

Central Valley wetland areas and the habitat they provide for many wildlife species are indeed a significant resource of California and to the United States as a whole. The Bureau of Reclamation and the Department of Water Resources recognize the need for water supplies for Federal and State wildlife refuges in the Central Valley. The Coordinated Operation Agreement, however, is designed primarily to provide for more efficient operation of the Central Valley Project and the State Water Project to meet mandated water quality and fish protection standards in the Delta.

Use of project supplies for fish and wildlife purposes is connected to project reauthorization, long-range studies, and agreements.

In 1954, Public Law 83-674 reauthorized the Central Valley Project to provide water supplies for fish and wildlife. This reauthorization was subject to priorities applicable under other Central Valley Project authorization acts. In 1977, a Memorandum of the Regional Solicitor, Sacramento, to the Fish and Wildlife Service Field Supervisor concluded that the Central Valley Project was authorized by the 1954 Act to provide water for fish and wildlife purposes under contract and subject to other priorities contained

in the 1937 Central Valley Project authorizing act.

The Central Valley Fish and Wildlife Management Study is investigating the water supply problems of the Central Valley wildlife refuges. The inter-agency team, which includes the U. S. Fish and Wildlife Service, is nearing completion of an appraisal-level study to identify problems and needs of the refuges. A 2-year planning study to identify sources of water and the best plan for the refuges will begin soon.

In spring 1985, the Fish and Wildlife Service began a 2-year study to determine the geographic extent and severity of agricultural drainage water contamination of fish, wildlife, and their habitats in the Grasslands area. Water, sediments, plants, invertebrates, fish, birds, and small mammals are being sampled and analyzed to determine contaminant levels in Federal and State wildlife areas and private duck clubs. Waterfowl are being sampled during mid- and late summer, fall, midwinter, and early spring to determine: (1) levels of contaminants birds bring with them to wintering grounds; (2) levels they pick up during overwintering; and (3) levels they carry with them back to breeding areas.

The Bureau of Reclamation recently agreed to a request by the Fish and Wildlife Service and Department of Fish and Game to furnish interim Central Valley Project water to wildlife refuge lands in the Grasslands area. This interim supply of fresh water will replace agricultural drainage water, which has been used, and will supplement the water supply to the wildlife areas.

On November 6, 1985, the State Water Resources Control Board approved an urgency water right change to pump an additional 28,000 acre-feet of water from the Delta for use on publicly owned and managed wildlife lands in the Grasslands area until March 1, 1986. Agreement has been reached with the

Department of Water Resources to wheel the water and with the Fish and Wildlife Service and Department of Fish and Game to share the costs for wheeling.

Area of Origin

Issue

The Coordinated Operation Agreement does not adhere to the California Watershed Protection Statutes because, under the proposed agreement, all Central Valley Project water users will be cut back by the same percentage during deficiencies. Exhibit E of the Agreement should provide a clear distinction between watershed users and non-watershed users and should preserve the priority in use for those in the watershed of origin.

Response

All negotiations and associated operation studies to develop the provisions of the Coordinated Operation Agreement recognized the California Watershed Protection Statutes.

Exhibit E does not apply to all Central Valley Project water users; it relates only to the contract for conveyance and purchase of Central Valley Project supplies by the State. Other Central Valley Project water supply contracts have different provisions or no provisions for deficiencies (such as the contract for Sacramento County). In the future, any new contract for Central Valley Project water supplies will include deficiency provisions, and all contracts will be in accordance with applicable law.

The Coordinated Operation Agreement is designed to avoid undue hardship to third parties (water users). Both Article 2 and Article 18 of the Agreement state this intent. Article 2 states that:

"The United States and the State each plans to meet all requirements and objectives of its project and to coordinate the operation of their projects so as not to adversely affect the rights of other parties and to conserve water."

Article 18 states:

"Nothing in this Agreement is intended to define, determine, limit, or affect the rights of third parties."

As discussed in Exhibit E of the Agreement, deficiencies in dry years will be imposed against all Central Valley Project water users at the same percentage, unless prohibited by existing contracts, Central Valley Project authorizations, or a determination by the Contracting Officer that some other method of apportionment is required to prevent undue hardship. This provision does not interfere with existing contracts, and it allows for future contracts.

Provisions in the Agreement also address the intent of both parties in connection with applicable statutory and decisional law in Article 11(d), which states:

"The parties do not intend by this Agreement to confer any additional authority upon either the Secretary of the Interior or the State Water Resources Control Board beyond that derived from applicable statutory and decisional law".

Seepage

Issue

Implementation of the Coordinated Operation Agreement will increase seepage along the Sacramento River. This impact was not adequately addressed in the Draft Environmental Impact Statement/ Report.

Response

Seepage impacts of the Coordinated Operation Agreement, discussed on pages 69 to 77 of the draft report, were found not to be significant. Additional information is presented here to explain the basis for this finding.

Seepage on agricultural lands along the Sacramento River has been a recurring problem since at least 1937. In some years, seepage of river water onto the lands adjacent to the river has damaged orchards and field crops.

A 1983 dissertation* provides a thorough review of the seepage problem along the Sacramento River and lists other State, Federal, and university reports dealing with this issue. This report discusses project operations that act to minimize seepage problems along the Sacramento River. The report states that operation of Shasta Reservoir generally diminishes the downstream seepage potential, and that seepage potential is about 80 percent of what would occur without upstream regulation. The report also suggests that, due to the geographic and temporal variation in seepage impacts, site-specific measures are more likely to be effective and economically justified than regionally-based solutions.

In a study by the Department of Water Resources (Bulletin 125), effects of operating Oroville Reservoir were evaluated relative to seepage problems along the Feather and Sacramento rivers. This study concluded that operation of Oroville Reservoir should reduce the probability of seepage damage along the Feather River. Overall, large peak floodflows, which cause seepage problems, should be reduced downstream of Oroville in the Feather and Sacramento rivers by reservoir operation.

The State also recognizes the importance of minimizing seepage problems; these concerns are addressed in statutes of the California Water Code. Because of extensive seepage damage resulting from high flows during the spring of 1958, the Legislature added two sections concerning seepage. Section 12627.3 established State policy that the costs of solving seepage problems arising from construction and operation of a water project will be borne by the project. Section 12627.4 directed the Department to contemplate seepage problems that may arise from future water projects and to include solutions as part of project development.

The worst-case approach used in the draft report seepage analysis is designed to create the maximum difference between no-project and the proposed action by holding the flow difference between Tracy standards and Exhibit A standards in storage in the no-project scenario. More likely operating assumptions would reduce or eliminate the differences, but would not necessarily represent a worst-case condition for impact evaluation purposes.

The seepage problems occur during periods of high riverflows and on low elevation lands. Seepage-prone areas and critical river stages have been identified for various reaches of the river. The critical stages at which seepage begins in the various reaches are not exact, as different studies have identified different critical stages. Seepage usually occurs for several days or weeks. An approximation of increased seepage potential for the proposed agreement can be made using the draft report operation studies, which report monthly riverflow at various locations along the river. These studies investigated operating conditions of no action and the proposed action and

*Priestaf, Iris Gail. Sacramento Seepage: Alternative Mitigating Measures. Ph.D. Dissertation, U.C. Berkeley, May 1983.

different levels of development. A riverflow station used to estimate potential seepage differences was below Red Bluff Diversion Dam. This point is actually upstream from the northernmost seepage-prone area; however, relative differences among the studies were made using that location.

For both studies, increased seepage potential was identified during only a few months, because Exhibit A standards and Tracy standards only deviate during dry and critical years. In other years seepage may occur, but the potential is the same for both Tracy standards and Exhibit A standards. Following are discussions of relative differences for the 1980 and 2020 level of development operation studies.

1980 Level of Development Study.

Sacramento River flows at Vina Bridge were compared between the Exhibit A standards and Tracy standards for each month of the 1980-level study.

In this study, an increased seepage potential was assumed if the monthly flow was about 1 million acre-feet or more in either the no-project or the proposed action conditions. This happens for only 3 months of the 1980-level study, which investigated 57 years, or 684 months. In 2 of these months, operation under the Coordinated Operation Agreement decreased seepage potential compared to the Tracy standards. In one month the Coordinated Operation Agreement standards slightly increased the seepage potential when compared to the Tracy standards.

2020 Level of Development Study. By examining the 2020-level monthly flow differences between the Exhibit A standards and Tracy standards, it appears that seepage conditions changed during only six months of the 77-year study period, which included 924 months. In each of the six months, operating under Tracy standards caused more seepage potential than operating under Exhibit A standards.

Southern Delta

Issue

The Environmental Impact Statement/ Report should correctly and adequately depict the potential impact of the Coordinated Operation Agreement on the southern Delta, particularly in relation to the potential for worsening the loss of agricultural pump draft in some channels (such as occurred during 1985).

Response

The current situation in the southern Delta is important, but signing the Coordinated Operation Agreement will not aggravate the pump draft problems. The Agreement assures that about 2.3 million acre-feet of State and Federal project yield during a critical water supply condition will be dedicated to Delta environmental and water supply protection and will be eliminated as a potential export source. In addition, the Coordinated Operation Agreement does not authorize any new contracts for water supplies that will require additional exports. Any such contracts will require further environmental documentation and consideration of mitigation measures.

Even though the southern Delta will not be impacted by the Coordinated Operation Agreement, the Department of Water Resources and the Bureau of Reclamation are working to solve the problems that now exist. On September 4, 1985, the Department and South Delta Water Agency signed a letter of intent to establish a program for ameliorating present water level and water circulation problems in the southern Delta. The letter is the first step toward a binding agreement.

The most important part of the letter of intent establishes a cooperative planning program that envisions

construction of facilities in some channels and an additional inlet gate to Clifton Court Forebay as well as widening and deepening of some channels. The letter also provides procedures for cooperating to prevent or minimize irrigation pumping draft problems before the new plan can be put into effect. The letter of intent is a separate issue from coordinated operation of the Central Valley Project and the State Water Project.

In January 1986, the Department of Water Resources prepared an Initial Study (under CEQA regulations) on a South Delta Agricultural Water Level Mitigation Project. The principal objective of the mitigation project is to improve the availability of water supply to existing irrigators in the Middle River and Tom Paine Slough areas pending a permanent solution. During the past few years, South Delta Water Agency has frequently expressed concern to the Department of Water Resources regarding low water levels in these areas caused by State, Federal, and other water development projects.

The proposed mitigation project is designed to reduce or eliminate some adverse water level conditions in the southern Delta. This project consists of dredging in Tom Paine Slough, possible installation of siphons at the inlet to Tom Paine Slough, and installation and removal of a seasonal weir in Middle River near Victoria Canal. The project is designed to allow farmers who depend on these waterways to increase their pumping to levels at or above those that would exist without the State Water Project and the Central Valley Project.

Recreation

Issue

Recreation should be a specifically authorized use of Central Valley Project

water. Impacts to recreation in upstream reservoirs were not sufficiently addressed in the Draft Environmental Impact Statement/Report.

Response

Although recreation is a significant use associated with Central Valley Project facilities, further authorization for recreational use of the Central Valley Project is beyond the scope and intent of the Coordinated Operation Agreement. Some components of the Central Valley Project have included authorization for recreation, including San Luis and New Melones reservoirs.

The draft report evaluated potential impacts to recreation in upstream reservoirs using hydrology studies to analyze the nature, extent, and frequency of drawdowns at each reservoir. Recreation impacts due to drawdown with and without the Coordinated Operation Agreement are shown on Table 14 (page 79) of the draft report. From information in this table, recreation impacts at Clair Engle, Whiskeytown, and Folsom reservoirs were judged to be not significant. A nominal change is shown for Shasta; this change includes a slight improvement and a slight adverse effect that tend to balance, for little change to annual recreation visits.

Impacts of the Coordinated Operation Agreement on recreation were judged insignificant. However, more information is presented below in response to interest shown in letters commenting on this subject. This information shows that recreational use of Central Valley Project reservoirs has been extensive and that present problems and issues are not related to the Coordinated Operation Agreement.

An investigation of recreation at Shasta, Clair Engle-Lewiston, Whiskeytown, Folsom, Natoma, and Auburn reservoirs is summarized in the Draft

Environmental Statement on the Reauthorization of the CVP and the Coordinated Operation Agreement for CVP-SWP (1980).

This report showed the nature of recreation, successful efforts to improve recreation, and the complex interrelated factors that affect recreation. Central Valley Project reservoirs and other features provide recreational opportunities for almost 10 million visitor-days of use per year. Managing agencies of each reservoir area were asked to provide information about existing and proposed facilities, carrying capacity constraints of facilities, scope and extent of recreation activities, specific factors that limit recreation at each lake, and optimum use based on capacities of facilities developed by the year 2020 (for Auburn and Folsom, 2000 was used to be consistent with recent master plans).

Levees and Cross-Delta Flows

Issue

Impacts from increased cross-Delta flows on levees have not been adequately addressed in the Environmental Impact Statement/Report.

Response

Operation of the Delta Cross Channel has caused continuing impacts on the channels of the Mokelumne River. The situation will exist with or without the Coordinated Operation Agreement, and the Agreement will not aggravate the problem. Analysis shows that cross-Delta flows under the Coordinated Operation Agreement will remain within the range that has existed since project operation.

The Department of Water Resources is discussing this issue with North Delta Water Agency, the reclamation districts, and landowners and will seek cooperation of the Bureau of Reclamation in analyzing and solving existing problems.

A letter dated July 19, 1984, from the Director of Water Resources to the Manager of North Delta Water Agency stated the Department's commitment to resolving this issue. The remainder of this response is a duplication of the Director's letter.

"The Department recognizes that there have been continuing impacts upon the channels of the Mokelumne River caused by the federal cross channel through which water of the federal Central Valley Project and some water of the State Water Project now flows. The Department of Water Resources will attempt to address this issue in consultation with the Agency, Reclamation Districts and landowners and seek the cooperation of the United States Bureau of Reclamation in the analysis and solution of existing problems.

"The Department of Water Resources is also aware of Delta landowner concerns that in proceeding with a State project we would attempt to limit our responsibility for erosion control to only those areas of actual construction as has been the history of the federal cross channel. This is not the case. We intend to analyze and examine conditions in the Delta to be sure we do not cause flow changes that could be reasonably considered to cause measurable adverse impacts without mitigating such impacts.

"It is recognized that existing preliminary design information may be insufficient to accurately project velocities and stages of channel flows. However, as detailed design and construction proceeds, the Department will prevent or correct erosion or seepage problems attributable to the project. Should operational experience of completed works reveal unforeseen impacts attributable to Department of Water Resources actions, they will be corrected.

Friant and New Melones Projects

Issue

An explanation should be provided as to why water diversion facilities on the San Joaquin River, such as Friant and New Melones dams, are not governed by this Agreement and why they are not expected to contribute to Bay-Delta water quality control. Also, New Melones should be included to provide a potential benefit to the Central Valley Project's power production.

Response

The Coordinated Operation Agreement defines specific project withdrawals to provide for established quality protection for the Delta. These withdrawals are based on Delta outflow needs, and, to the extent upstream projects such as Friant and New Melones alter Delta inflow, this change must be compensated by other reservoirs. Storage withdrawals were designed to be a function of integrated State and Federal project operations to meet total Delta needs, rather than a function of individual reservoir releases to meet specific proportions of outflow needs. This design provides flexibility benefits for coordination and operation of the State Water Project and Central Valley Project.

Providing the greatest flexibility for coordination and operation of the State Water Project and the Central Valley Project was a major goal in formulating the Coordinated Operation Agreement. Provisions were designed for both projects to fairly share in meeting established Delta protective measures, protecting the financial integrity of the projects, and continuing to meet project responsibilities including power and water supply. This required a careful look at all facilities of both projects and selection of optimal operational criteria.

"The contract between the State and the North Delta Water Agency dated January 28, 1981, provides in Article 6 for the repair or alleviation of any erosion or water level impacts caused by the State Water Project upon users within the Agency. I concur that a supplemental agreement with the Agency should be agreed upon prior to construction of channel work in the North Delta envisioned in Senate Bill 1369 to implement this contract provision, existing Water Code sections 12627.3, 12627.4 and section 12627.5 proposed for Senate Bill 1369.

"The supplemental agreement between the State and the Agency, and the State's commitment to Reclamation Districts and landowners abutting effecting channels, will cover at least the following points:

- "(a) Designation of an employee by Department of Water Resources to be responsible for liaison with the Agency, Reclamation Districts and landowners.
- "(b) Appointment by the Agency of an advisory committee to the Department on such matters as the selection of project design criteria, construction specifications, alignment, and right-of-way requirements. This would include recreational features.
- "(c) Provision to the Agency by Department of Water Resources of all applicable records and files relevant to and indicative of flows and seepage from the channels in the North Delta. This information will be made available prior to the agreement if requested by Agency.
- "(d) Provision for detailing maintenance standards and appropriate sharing of financial responsibility for maintenance among the Department and Reclamation Districts."

Even though Friant Dam (Millerton Lake) and New Melones Dam projects are not included in Article 3 of the Agreement, which pertains to storage withdrawals, they are included in Article 5, which lists existing project facilities integrated into operation studies used to develop and confirm governing provisions of the Agreement. Including these projects in the operation does influence storage withdrawal amounts. In addition, New Melones and Friant are operated in accordance with authorized priorities. New Melones priorities include flood protection, municipal and industrial water supply, power, fishery enhancement, and water quality. Reservoir releases for fish and water quality are governed by regulation separate from the Coordinated Operation Agreement and represent contributions to the estuary in addition to the Agreement. Both Friant and New Melones are operated to optimize power in accordance with authorized priorities, and this operation will continue. Friant does not produce any Federal power; the local districts operate the power plants. Power is only incidental to other authorized purposes.

To evaluate and finalize the Agreement provisions, the existing project facilities identified in Article 5 and the project water supplies from Exhibit B-1 and B-2 were used to complete detailed project operation studies. The methodology used is described in the Technical Report on the Determination of Annual Water Supplies for the Central Valley Project and State Water Project. This report is cited in Article 6 of the Agreement and is included as Appendix G of the draft report.

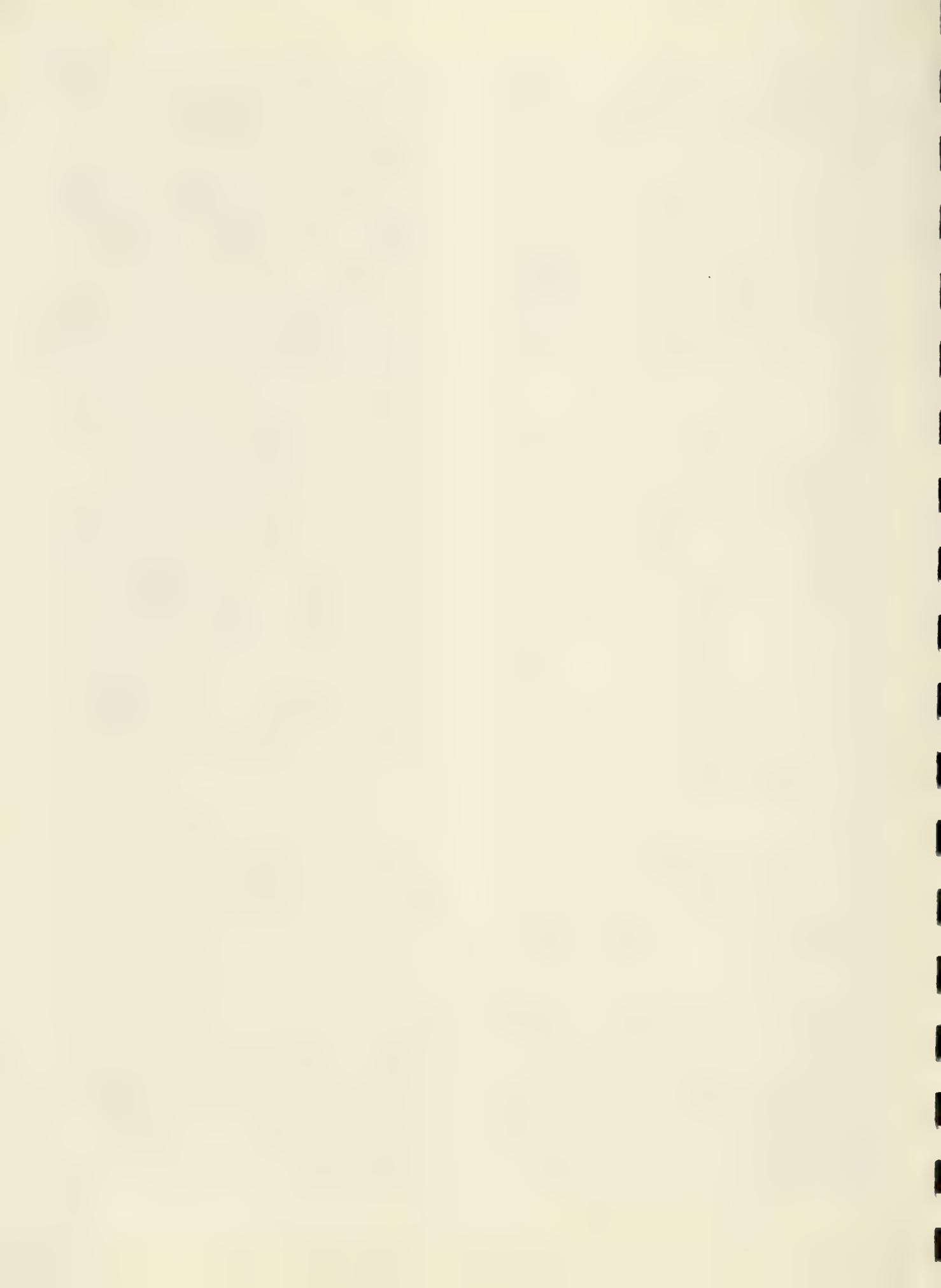
The operation studies evaluated project operations to meet Delta protective criteria, to provide flows for instream needs, to meet project water supply deliveries, and to provide power. Operations were investigated for a sequence of historical years, but with the hydrology adjusted to reflect the level of development to be studied. This adjustment process accounts for

both Friant and New Melones projects and computes total needed project releases. This adjustment divides the Central Valley into 40 subareas, including all the basins tributary to the Delta. For each subarea, adjustments included area inflow and outflow, imports and exports, consumptive use by developed areas, and any modifications due to regulating facilities such as reservoirs.

This adjusted hydrology includes the effects of the Friant and New Melones projects on the San Joaquin River, which is tributary to the Delta and, therefore, directly affects the magnitude of required storage withdrawals. Even though these reservoirs were integrated into project operations to define storage withdrawals, the adjustments showed that, due to the magnitude of prior in-basin commitments, neither facility will have the necessary long-term storage flexibility to help meet withdrawal requirements in Article 3 of the Agreement. Each facility, on occasion, makes releases that do add to the unregulated flow available for export and water quality in the Delta. However, during balanced water conditions, when the sharing formula of the Agreement would be in effect, water is fully committed for in-basin use under the ultimate level of development for both facilities.

On an interim basis, some supplies from New Melones may not be fully used. To the extent these supplies provide unregulated or regulated inflow to the Delta by increasing San Joaquin River flows, this will benefit the estuary.

In the future as the amount of New Melones supplies that provide inflow to the Delta on an interim basis is better defined, it can be incorporated into the joint periodic review of the agreement according to Article 14. This article calls for review of operation studies supporting this Agreement. This review can result in adjustments to account for the influence that this potential interim Delta inflow has on project responsibilities to meet Delta needs.



Section 2. CORRECTIONS AND ADDITIONS

This section updates the text and appendixes of the draft report to the Final Environmental Impact Statement/ Report for the Coordinated Operation Agreement. Changes and updates result, in part, from comments obtained during the public review period. All written comments and verbal testimony received on the draft report were reviewed in detail and acted on, using one or more of the following:

- ° Incorporation into general issue response (see Section 1);
- ° Change to the draft report by correction or addition, as presented in this section;
- ° Acknowledgement of comment by reproduction of the comment letter or testimony by publication in Section 3.

A special case was the Fish and Wildlife Service Coordination Act Report on the Coordinated Operation Agreement. This report, along with responses by the Bureau of Reclamation, is included in this section. The responses by the Bureau also represent the response to the Department of Fish and Game's comments recommending mitigation measures.

Page S-2, right column, paragraph 3

Change 8.4 MAF to about 8.3 MAF.
Change 3.6 MAF to 3.7 MAF.

Page S-3, left column, paragraph 1

Change the first sentence as follows:

Section 10(h) calls for a contract to be concluded by December 31, 1988, for

the annual purchase of interim and intermittent CVP water by the SWP, which can be recalled by the CVP when needed by existing or new long-term CVP contractors.

Page S-3, left column, paragraph 3

Reword the paragraph as follows:

The Agreement protects the interests of both projects while improving the level of protection afforded the water-related environment of the Sacramento-San Joaquin Delta.

Page S-6, partial paragraph top of left paragraph

Change 143,000 acre-feet to 152,000 acre-feet.

Page S-6, right column, paragraph 1

Reword the second sentence as follows:

Critical years occur less than 10 percent of the time, and operations during other year types would have smaller or no change to significantly affect storage.

Page S-7, right column, paragraph 1

Delete the last sentence and substitute the following:

Under worst-case operating conditions, the potential for temperature change exists at upstream locations below Central Valley Project reservoirs. Frequency and magnitude of potential impacts to salmon were investigated and judged not to be significant. It

was determined that the Proposed Action provided many protective flows for salmon above No Action in the Delta.

Page S-8, partial paragraph top of left column

Delete the second sentence and replace with the following:

Terms of the moratorium provide that it would be lifted when the Bureau committed itself to meet State Delta water quality standards incorporated into a coordinated operation agreement, the issue of instream flow needs have been resolved, and the water needs for migratory birds on Central Valley National Wildlife Refuges have been met. There is an uncommitted water supply of the CVP of about 1 million acre-feet annually. When the Coordinated Operation Agreement is signed, the Bureau of Reclamation will commit itself to the standards set forth in Exhibit A.

A number of studies are investigating instream flow needs for fish on the Sacramento, American, and Trinity rivers and Clear Creek. The Bureau of Reclamation is also studying the water needs of the wildlife refuges. Results of the above studies for fish and wildlife needs will be incorporated into the marketing program for the uncommitted supply of CVP water.

Page S-8, left column, paragraph 1

Delete and replace with the following:

The Bureau of Reclamation will be studying the marketing of water to the service areas of the CVP. Any future contracts would require new contractual agreements separate from the Coordinated Operation Agreement and must provide environmental documentation as required by law.

Page S-9, Table S-1

Change 143,000 acre-feet to 152,000 acre-feet.

Delete the first footnote and substitute the following:

No incremental impacts between the No Action alternative and Proposed alternative were judged to be significant based on CEQA criteria listed in Appendix K.

Page 8, left column, paragraph 3

Delete paragraph and replace with the following:

In-basin needs projected by operation studies consist of Delta needs and Sacramento Valley needs upstream of the Delta. Sufficient water is released by reservoirs to assure that both the Delta and upstream in-basin needs are met. This is verified in the Delta by monitoring to ensure compliance with Delta water quality standards and flow requirements contained in Exhibit A.

Page 12, partial paragraph, top of right column

Add the following paragraph after the partial paragraph:

Although the Agreement specifies April 30 as the final day for makeup wheeling, a letter received by the Department of Water Resources and Bureau of Reclamation from the State Water Resources Control Board states that March 31 is the final date. Any inconsistency between the letter and the Agreement is being reviewed and will be resolved with the State Water Resources Control Board.

Page 22, partial paragraph, top of right column

Reword the sentence as follows:

Current Bureau policy is an interim policy designed to operate to meet the Decision 1485 standards in ordinary critical years and to consider not meeting these standards only in years such as 1977, the driest year of record.

Page 25, left column, paragraph 3

Change the revised standards from 1988 to 1989.

Page 26, left column, paragraph 3

Delete the last sentence and substitute the following:

The Fish and Wildlife Service proposal was not accepted by the negotiating team of the Coordinated Operation Agreement.

Page 28, left column, paragraph 2

Delete the second sentence.

Page 34, left column, paragraph 2

Change 2,273,000 to 2,274,000.

Page 34, left column, paragraph 4

Change 983,000 to 982,000.

Page 34, Table 4

Change the following:

+1,118 to +1,188
-2,273 to -2,274
-1,071 to 1,072
-983** to -982**

"**about 143,000 acre-feet" to
"**about 152,000 acre-feet".

Page 34, partial paragraph, top of right column

Change 143,000 to 152,000.

Page 36, right column, paragraph 2

Change about 140,000 acre-feet to 152,000 acre-feet.

Page 37, left column, paragraph 1

If both projects are operated in a manner that assures realization of the No-Action Case A scenario in critical years, firm annual water supplies at the 1980 level of development increase by about 113,000 acre-feet for the CVP and about 178,000 acre-feet for the SWP.

Page 37, Mitigation Measures

Delete paragraph and replace with the following:

The Agreement provides an overall improvement of resource level protection. The Exhibit A standards of the Proposed Action are mitigation for the projects. There is no proposed mitigation for the Proposed Action beyond the Exhibit A standards.

Under worst-case operating conditions, the potential for temperature change exists at upstream locations below Central Valley Project reservoirs. The frequency and magnitude of potential impacts to salmon were investigated and judged not to be significant. It was determined that the Proposed Action provided many protective flows for salmon above No Action in the Delta.

Temperature control for fish protection in the Sacramento and Trinity rivers is an important concern in operation of the Central Valley Project and is the subject of ongoing studies. Further studies and actions are reviewing various protective measures for this concern separate from this proposed action.

The Bureau of Reclamation evaluated multilevel outlets for Trinity and Shasta dams. The Trinity Dam study is complete, however, the ability of multilevel outlets to mitigate Coordinated Operation Agreement impacts was not evaluated. The feasibility of multilevel outlets at Shasta Dam for controlling Sacramento River temperatures is being evaluated in the Central Valley Fish and Wildlife Management Study scheduled for completion during 1986. Benefits appear to be marginal in most years and even less effective in critical years when cold water availability in Shasta Lake is depleted during severe drawdown.

Another measure to increase the survival rate of fish involved construction of a temperature control curtain at Lewiston Lake and special project operations during critical periods of temperature increase. The curtain allows warmer surface water to be skimmed and channeled into the incubators and rearing ponds at Trinity River Fish Hatchery. An increase in temperature of one or two degrees greatly benefits the growth of young fish. The rate of return of steelhead has increased since the curtain was installed.

Special operations to improve the water temperature and flow situation have occurred in the past. The Bureau of Reclamation and the Department of Water Resources cooperated in altering operations at Shasta, Trinity, Folsom, and Oroville reservoirs to provide the

best available water temperatures and to stabilize flow releases during the spawning period in the 1976-1977 drought. Water temperatures were reduced on the Sacramento River by using cooler Trinity-Whiskeytown water with a corresponding decrease in releases from warmer Shasta Reservoir. American River temperatures were lowered by using the Folsom Dam low level outlet near river elevation. This operation was at the expense of some power production. The Coordinated Operation Agreement improves the ability for both projects to better use existing supplies and to provide this type of special operation.

Page 38, Table 5

Change 143,000 acre-feet to 152,000 acre-feet.

Page 39, left column, paragraph 3

Reword the sentence as follows:

The Proposed Action and No Action are considered within the context of the State of California, the Central Valley Basin, Trinity River Basin, and the two largest water development projects in that basin: the Central Valley Project and the State Water Project.

Page 49, left column, paragraph 2

Replace the first sentence as follows:

Under Decision 1485, chloride content of the water at either Rock Slough or Antioch Water Works intake on the San Joaquin River is required to be 150 ppm or less for a minimum of 155 days per year, and Rock Slough may not exceed a maximum mean daily value of 250 ppm at any time.

Page 49, left column, paragraph 3

Replace the first sentence as follows:

Usable water is available for direct diversion in the Antioch-Pittsburg area for varying amounts of time, depending on prevailing hydrology.

Page 55, right column, partial paragraph 1

Add the following:

If the termination provisions in Article 10(h)(5) of the Coordinated Operation Agreement were implemented, actual operations would not be worse than the No Action alternative. Historical operations have shown that the Bureau of Reclamation has operated the CVP to meet Delta requirements.

Page 58, right column, last paragraph

Delete the paragraph and replace with the following:

- ° Flow in Delta Channels. Operating the CVP and the SWP to the Tracy standards in critical years would increase the frequency and magnitude of reverse flows in the lower San Joaquin River in April, causing an increase in the number of striped bass from the Sacramento River that would be drawn to the export pumps. Also, flows in the Sacramento River would decrease in April, May, and June compared to operation for the Exhibit A standards, further reducing the survival of striped bass migrating down the river.

Page 62, partial paragraph, top of right column

Change 143,000 acre-feet to 152,000 acre-feet.

Page 64, right column, paragraph 1

Change 7.32 million acre-feet to about 7.17 million acre-feet.

Page 64, left column, paragraph 2

In two places change 143,000 acre-feet to 152,000 acre-feet.

Page 66, Table 9

Change the table as follows:

Sacramento Valley: Change losses to 49,000 and subtotal to 3,147,821. Change Total from 7,132,922 to 7,189,622.

Delta: Change San Felipe Unit to 216,000 and subtotal to 3,207,601.

Page 71, left column, paragraph 2

Add the following sentence:

The Trinity River below Lewiston Dam is a component of the National and State of California Wild and Scenic Rivers systems.

Page 73, left column, paragraph 2

Add the following sentence:

The American River below Nimbus Dam is a component of the National and State of California Wild and Scenic Rivers systems.

Page 73, right column, last paragraph

Reword the second sentence as follows:

The differences would arise principally in critical years and with lesser effect in the year(s) immediately following critical years.

Page 74, partial paragraph, top of left column

Add the following sentence:

The Proposed Action was judged consistent with both State and Federal Acts concerning wild and scenic rivers.

Page 80, right column, paragraph 2

Add the following paragraphs after the second paragraph:

Operation of Folsom Lake with the Coordinated Operation Agreement is not expected to require pumping from any lower level than has been planned for the reservoir in the absence of the Coordinated Operation Agreement. However, because the Coordinated Operation Agreement permits operation of the CVP to meet its full potential of benefit, the project reservoirs will be drawn down to their lower operating levels more often, but not lower than originally contemplated. In the absence of the Coordinated Operation Agreement this could have been the situation anyway, because project power operations will also draw down the reservoirs in many years.

The No Action scenario used in this report, wherein Delta water quality standards were relaxed to Tracy criteria in critical years, resulted in higher levels in Folsom Lake simply due to the assumptions used in that study. These assumptions were primarily to evaluate worst-case conditions and are not representative of future operating conditions. The study assumed existing facilities, which limited the use of CVP firm yield. In the case of the No Action scenario, a portion of the conserved CVP supplies available by not meeting Delta standards were stored in Folsom. This operation assumes that stored supplies would be left in reservoirs

during critical water supply periods when statewide shortages exist. It is likely, however, that in actual operations, Folsom will be drawn down to the same low levels in critical years under any scenario. It is the easiest CVP storage facility to refill, due to its high ratio of average runoff to active storage. The operation study used to evaluate the Coordinated Operation Agreement is just one of many ways the project could be operated to meet its objectives. Based on the probable infrequent occurrence of the worst-case condition and the fact that minimum drawdown levels will not change, no mitigation is proposed.

Page 83, left column, first paragraph

Delete second sentence.

Page 88, right column

Insert the following paragraph after the paragraph beginning "Final design...":

The work program for the western Delta overland facilities consists of three phases: Phase I is a feasibility study and environmental documentation. Phase II will be design, and Phase III will be construction if warranted by Phase I findings. An agreement between Reclamation District 341 and the Department of Water Resources for a portion of Phase I work has been drafted. This agreement specifies that the Department will pay up to \$300,000 for a feasibility study and documentation of environmental impacts that may occur on Sherman Island. If the agreement is approved, an engineering consulting firm will be selected to perform the work.

Page 91, right column, paragraph 2

Replace the second sentence with the following:

From the reservoir, water will flow through the 1.8-mile existing section of Pacheco Tunnel and be lifted by Pacheco Pumping Plant to the 5.3-mile Pacheco Tunnel Reach 2. From the tunnel, water will be conveyed by gravity through pipelines to the terminal facilities in Santa Clara County and the San Justo Reservoir in San Benito County.

Page 97, right column, paragraph 4

Delete the third sentence and replace with the following:

The terms of the moratorium provided that it would be lifted when the responsibilities of the CVP toward water quality protection in the Delta had been clarified and the Bureau had committed itself to meet these and other responsibilities. The Bureau intends to resume entering into long-term water service contracts once the Coordinated Operation Agreement is signed and other requirements are completed. Regarding these requirements, the Bureau is doing the following.

Page 97, right column, paragraph 4

Add the following:

A number of studies are addressing instream flow needs. Increased minimum flows in the Trinity and American rivers were discussed in the section on Other Projects and Actions. A portion of the Central Valley Fish and Wildlife Management Study is studying salmon spawning and the benefits and costs of increased flows in Clear Creek. Another portion of that study is evaluating several alternative flow regimes for salmon in the Sacramento River.

The Bureau is studying water supply needs for Federal and State wildlife refuges in the Central Valley as part of the Central Valley Fish and Wildlife Management Study. A 2-year planning study on water needs has begun that will identify sources of water and methods to deliver a firm supply of water of acceptable quality to the refuges and the Grasslands.

Page 97, right column, last paragraph

Delete paragraph.

Page 98, partial paragraph, top of left column

Delete paragraph.

Page 98, left column, paragraph 1

Insert new paragraph:

The Bureau will be preparing environmental impact statements for future water marketing for the Central Valley Project. The marketing program to be undertaken will not be completed for some time. However, studies on fish and waterfowl needs should be completed before completion of the water marketing program. Efforts to meet all water needs will be considered part of the marketing action separate from the Coordinated Operation Agreement.

Appendix A, page 7

Add San Justo Reservoir to the facilities of the United States.

Appendix C, page 3, paragraph 2

Change last sentence as follows:

Some of the concerns of the Fish and Wildlife Service are as follows:

Appendix C, pages 3-9

Change Recommendation No. 1 through Recommendation No. 5 to Concern No. 1 through Concern No. 5.

Appendix G, page 6

Add the following paragraphs:

The Bureau of Reclamation has on several occasions reevaluated the water needs of various service areas, including the Tehama-Colusa Canal service area. Reevaluation of water requirements is desirable and necessary for several reasons, including: changing agricultural economics, as reflected through projected cropping patterns; increasing availability of empirical data on crop water requirements; and integration of water conservation measures.

In general, empirical data gathered from districts in the Sacramento Valley demonstrate significantly smaller per-acre-foot water require-

ments than those previously projected through use of mathematical models. Required conservation measures will continue to necessitate more efficient delivery systems and higher tailwater recapture percentages. In accordance with requirements of the Reclamation Reform Act of 1982 and California State water conservation programs, the Mid-Pacific Region will require prudent use of available nonproject resources, including ground water. In general, these considerations result in a reduction of the estimated project water needs of a given service area.

It is the Bureau of Reclamation's responsibility to ensure efficient use of a valuable resource and thereby prevent overallocation of water to a given contractor or service area. Occasional reevaluation of future water needs of contractors requesting new or additional project entitlements greatly assists the Bureau in meeting this planning objective. Such a practice reduces the probability of economic hardship upon a district constructing and operating a distribution system or potentially unable to pay for a full contracted supply without undue financial burden.



**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE**



**CVP/SWP COORDINATED
OPERATION AGREEMENT
CALIFORNIA**



**A DETAILED REPORT ON
FISH AND WILDLIFE RESOURCES**

REGION ONE



United States Department of the Interior

**FISH AND WILDLIFE SERVICE
Lloyd 500 Building, Suite 1692
500 N.E. Multnomah Street
Portland, Oregon 97232**

NOV 26 1985

Memorandum

**To : Regional Director, Mid-Pacific Region, Bureau of Reclamation
Sacramento, California**

**From : Regional Director, Region 1, Fish and Wildlife Service
Portland, Oregon**

**Subject : Fish and Wildlife Coordination Act Report on the Coordinated
Operation Agreement**

This memorandum, with the attached detailed assessment, constitutes our Coordination Act report of the effects on fish and wildlife resources of implementing the "Proposed Agreement between the United States of America and the Department of Water Resources of the State of California for Coordinated Operation of the Central Valley Project and the State Water Project." The proposed agreement, dated May 20, 1985, and commonly referred to as the Coordinated Operation Agreement, or COA, would make possible more efficient operation of the Federal Central Valley Project (CVP) and the State Water Project (SWP). Additionally, under terms of the COA the Bureau of Reclamation would be obligated to operate the CVP to meet the water quality standards for protection of the Sacramento-San Joaquin Delta set by the State Water Resources Control Board in Decision 1485.

Our analysis is based on information provided by the Bureau of Reclamation prior to June 1, 1985 —including the draft COA; operation studies at 1980 and 2020 levels of development under Tracy (in dry and critically dry years only) and D-1485 water quality standards; and the internal review draft Environmental Impact Statement/Environmental Impact Report on the COA, dated May 21, 1985. This analysis is valid only for the draft COA of May 20, 1985. In the event that the draft COA is modified a revision of this report may be necessary.

This report was prepared under authority, and in accordance with the provisions, of the Fish and Wildlife Coordination Act (16 U.S.C.661 et seq.) and is intended for inclusion in the Bureau of Reclamation's report on the proposed action. This report has been reviewed and commented on by the California Department of Fish and Game as indicated by the attached copy of a letter from Director Jack C. Parnell, dated October 17, 1985. Also, it has been reviewed and concurred in by the National Marine Fisheries Service; their letter is attached for your information.

Considering the importance of the fish and wildlife resources that would be affected by the proposed action, this report, required for your compliance with the Fish and Wildlife Coordination Act, is inappropriately brief and unsupported by field studies as normally required for evaluating a proposed action of this significance. Time allowed for report preparation was too short due to the brief period between completion of the draft COA and its being taken up by the Congress for action. As such, our recommendations to mitigate the impacts of the proposed action are not reflected in the draft COA as they normally might have been. The recommendations should not, however, be wholly unexpected on your part since they are consistent with input to your draft environmental statement which was provided to you in December 1983.

The COA would affect habitat for fish and wildlife resources in (1) the Sacramento-San Joaquin Delta — its waterways, agricultural lands, and Suisun Marsh, (2) the Central Valley — especially CVP/SWP-controlled rivers and reservoirs, and CVP/SWP water service areas, (3) the San Francisco Bay system upstream to the western boundary of the Delta, and (4) the Trinity River basin — principally Clair Engle and Lewiston Lakes and reaches of the Trinity River.

Based on our analysis, we conclude that implementation of the COA would beneficially impact striped bass and chinook salmon habitat in the Sacramento-San Joaquin Delta and waterfowl habitat in Suisun Marsh but adversely impact fish and wildlife habitat in the Federal and State water service areas, in San Francisco Bay, and in the Sacramento, American and Trinity Rivers. While we are pleased that better water conditions would exist for fish and wildlife in the Delta, our foremost concern is that the COA would (1) exacerbate temperature problems in the Sacramento, American and Trinity Rivers affecting salmon spawning and egg incubation, and (2) perhaps reduce opportunities to secure a firm supply of CVP water for Federal and State wetland areas in the Central Valley, and meet unidentified/unmet mitigation needs of past constructed units of the CVP. Salmon threatening increases in water temperature downstream from Shasta, Folsom and Clair Engle Reservoirs would result from COA-induced changes in reservoir storage levels and release volumes. During and immediately following critically dry years severe decimation of salmon runs would be highly likely and extirpation of the winter-run race of salmon in the Sacramento River is not inconceivable. For maintenance of wintering habitat in the Central Valley for Pacific Flyway waterfowl populations, it is essential that a firm supply of CVP water be provided to nine wildlife refuges and two wetland easement areas administered under the National Wildlife Refuge System, and to three wildlife management areas administered by the California Department of Fish and Game. This need should be met before the uncommitted firm yield of the CVP, some of which is made possible by the COA, is committed to other uses. The Department of Interior's position on authority to commit CVP firm supply for waterfowl purposes is presently unclear but I understand that clarification may be forthcoming. Further, CVP power should be provided on a non-reimbursable basis to the nine national wildlife refuges, four State waterfowl management areas, and to Coleman National Fish Hatchery.

We must also note that there are known deficiencies in the D-1485 standards that preclude protection of Delta fish habitat at the desired level; habitat necessary for estuarine fish as well as upriver-spawning species which migrate thru the Delta. D-1485 standards may be inadequate for striped bass. Since 1978 the recruitment of striped bass has been very poor. D-1485 standards provide inadequate spring

outflow conditions for juvenile salmon; several years of data supporting this inadequacy have been collected since 1978. These are not yet standards for the protection of San Francisco Bay. These deficiencies will be addressed during upcoming hearings to be held by the State Water Resources Control Board.

The Fish and Wildlife Service therefore recommends that for mitigation of the impacts of the COA:

1. Multiple-level intakes to the outlet structures at Clair Engle and Shasta Lakes be provided to allow the best possible control of water temperature for protection of downstream fisheries.
2. Until multiple-level intakes to the outlet structures at Shasta and Clair Engle Lakes are in operation, storage be held at levels sufficient to assure that release water maintains the temperature in downstream reaches utilized by salmon for spawning and egg incubation at or below 56° F.

And in furtherance of the December 29, 1978 decision by the Secretary of the Interior to conserve fish and wildlife resources and specifically provide a guaranteed water supply to Central Valley national wildlife refuges, the Fish and Wildlife Service recommends:

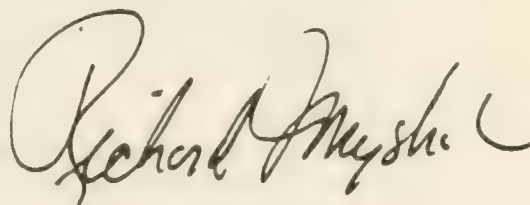
3. Minimum flows from the Folsom Project to the lower American River be set at:
 - a. No less than 1750 cubic feet per second from Nimbus Dam to the Howe Avenue Bridge from October 15 to December 31, for spawning salmon;
 - b. No less than 1250 cubic feet per second from Nimbus Dam to the Howe Avenue Bridge from January 1 to March 31, for salmon incubation and rearing;
 - c. No less than 1250 cubic feet per second from Nimbus Dam to the mouth of the American River from April 1 to June 30, and such additional flow as may be required to prevent water temperature at the mouth of the American River from exceeding 65° F, for salmon rearing and out-migration;
 - d. No less than 800 cubic feet per second from Nimbus Dam to the mouth of the American River from July 1 to March 31, for all fishery purposes.
4. At least 60,000 acre-feet of water be reserved in Folsom Reservoir for release at the direction of the fishery resource agencies during the period October 15 to June 30 to facilitate upstream and downstream migration of salmon.
5. The minimum flow from the Shasta/Trinity project to the Sacramento River be set at 6,000 cubic feet per second pending the results of a 2-year study currently being undertaken by the California Department of Fish and Game on the relationship of river flows to fish habitat in the river.

6. A firm annual supply of 211,000 acre-feet of Class 1 water be furnished, on a non-reimbursable basis, to Central Valley national wildlife refuges.
7. A firm annual supply of 246,000 acre-feet of Class 1 water be furnished, on a non-reimbursable basis, to the Grasslands Resource Conservation District and Butte Sink Area to serve migratory bird needs.
8. A firm annual supply of 78,000 acre-feet of Class 1 water be furnished, on a non-reimbursable basis, to the State of California's Los Banos, Mendota, and Gray Lodge Wildlife Management Areas.
9. A firm supply of power be provided, on a non-reimbursable basis, to Central Valley national wildlife refuges, State waterfowl management areas, and to Coleman National Fish Hatchery.
10. No further contracting of CVP firm supply for agricultural, municipal or industrial uses be undertaken until all fish and wildlife needs associated with the CVP have been identified, resolved, and solutions authorized.

In a variety of ways and times the Service has previously informed the Bureau of Reclamation of the above needs and has requested that the CVP be reauthorized with fish and wildlife conservation as a co-equal purpose and the above basic and long-standing fish and wildlife needs for offsetting project impacts be provided. The Bureau has not supported these requests via the COA. The COA has been taken up by Congress without benefit of an accompanying Fish and Wildlife Coordination Act report. Consequently, Congressional action taken to date does not include compensation for fish and wildlife impacts associated with implementation of the COA.

As a result, this report is essentially an after-the-fact action. However, it is being submitted in conformance with our Coordination Act obligations and to again stress the need for our agencies to be in accord with the December 29, 1978 Secretarial decision on operation of the CVP. Further, submission of this report affords yet another opportunity to resolve fish and wildlife resource needs before Congressional authorization of the COA.

Please advise us of your proposed actions regarding our recommendations.



Richard J. Myshak

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Portland, Oregon

A DETAILED ASSESSMENT
OF THE
CENTRAL VALLEY PROJECT/STATE WATER PROJECT
COORDINATED OPERATION AGREEMENT

(This detailed assessment plus the covering
memorandum of November 26, 1985, constitutes
the Coordination Act Report)

INTRODUCTION

This is our detailed report of the effects on fish and wildlife resources of implementing the "Proposed Agreement between the United States of America and the Department of Water Resources of the State of California for Coordinated Operation of the Central Valley Project and the State Water Project." The proposed agreement, dated May 20, 1985, and commonly referred to as the Coordinated Operation Agreement, or COA, would make possible more efficient operation of the Federal Central Valley Project (CVP) and the State Water Project (SWP). Additionally, under terms of the COA the Bureau of Reclamation would be obligated to operate the CVP to meet the water quality standards for protection of the Sacramento-San Joaquin Delta set by the State Water Resources Control Board in Decision 1485.

Considering the great importance of the resources that would be affected by the proposed action, this report is inappropriately brief because of the extremely short time allotted for its preparation. No time was available for studies or generation of project-specific data on our part. Existing data had to be used for our analyses. Geographic areas covered include the Sacramento-San Joaquin Delta, the entire Central Valley (including Federal and State water service areas), the San Francisco Bay system, and the Trinity River basin. Our analysis is based on information provided by the Bureau of Reclamation prior to June 1, 1985 — including the draft COA; operation studies at 1980 and 2020 levels of development under Tracy (in dry and critically dry years only) and D-1485 water quality standards; and the internal review draft Environmental Impact Statement/Environmental Impact Report on the COA, dated May 21, 1985. This analysis is valid only for the draft COA of May 20, 1985. In the event that the draft COA is modified before it is submitted to the Congress for ratification, a revision of this report may be necessary.

The COA establishes a formula for CVP-SWP sharing of exportable water from the Delta and for sharing of responsibility for supplying water to the Delta and the Sacramento basin. It also allows for improved estimates of project yield, and facilitates marketing of the available water resource. A consequence of implementing the COA would be that D-1485 standards would be met in all years, unless the parties to the agreement should seek relaxation of the standards in critically dry years. The standards were relaxed during the 1977 drought. During that period water conditions were so critical that the only way the standards could have been continually met would have been to greatly reduce the delivery of water to the service area or to have drawn the reservoirs below their minimum power-generating pools.

Our recommendations for the protection of fish and wildlife resources are based on the Fish and Wildlife Service's Mitigation Policy (Federal Register 46:15, January 23, 1981) which provides internal guidance for establishing appropriate compensation for projects under our purview. Under the policy, resources are assigned to one of four categories to assure that our recommendations for compensation are consistent with the fish and wildlife values involved. The resource categories cover a range of habitat values from those considered to be unique and irreplaceable to those believed to be of relatively low value to fish and wildlife. The Mitigation Policy does not apply to threatened and endangered species.

The Mitigation goals for the four categories are:

- Resource Category 1 - No loss of existing habitat value
- Resource Category 2 - No net loss of in-kind habitat value
- Resource Category 3 - No net loss of habitat value while minimizing loss of in-kind habitat value
- Resource Category 4 - Minimize loss of habitat value.

In accordance with the Mitigation Policy, the following category designations were made:

<u>Resource</u>	<u>Resource Category</u>
Winter-run chinook salmon	1
Anadromous fish other than winter-run chinook	2
Migratory birds	2
Non-migratory fish and wildlife (basinwide)	2 and 3
Non-migratory wildlife on service area lands	2, 3 and 4
Non-migratory fish in water distribution facilities	4

Winter-run chinook salmon habitat has been identified as resource category 1 for all the possible reasons. Winter-run chinook salmon are unique to the mainstem Sacramento River; they are not found elsewhere in the nation. Their habitat appears irreplaceable. Sacramento River winter-run chinook salmon habitat is of high value unless degraded by adverse water temperatures.

Other anadromous fish and migratory bird habitat has been identified as resource category 2. All anadromous fish habitat is scarce on a regional basis. The vast majority of stream miles of salmon and steelhead trout habitat has been severed by dams. The few remaining miles accessible to anadromous salmonids are often large rivers but they are not without problems. Salmon and steelhead populations are greatly diminished. Migratory bird habitat is also scarce, particularly for birds dependent on emergent wetlands and woody riparian vegetation.

Habitat for resident fish and wildlife have been placed in resource categories 2, 3, or 4 depending on values, scarcity, replaceability, etc. On the average it would be identified as resource category 3.

In many cases resources assigned to different resource categories exist in the same space such as is the case with anadromous fish and non-migratory fish. Where that occurs, our recommendations for resource protection are dictated by the most valued resource.

Analysis of the environmental impacts of the proposed action has, like the planning for the action itself, been a joint Federal-State endeavor. Input to the draft Environmental Impact Statement/Report, in large part the basis for this report, was performed jointly. The Department of Fish and Game did the impact analyses relating to the Bay and Delta fisheries, Suisun Marsh wildlife, and SWP service area fish and wildlife. The Fish and Wildlife Service was responsible for impact analyses relating to rivers inland of the Delta, reservoirs, CVP service areas, and endangered species.

The Fish and Wildlife Service concurs in the Bureau of Reclamation's biological assessment that the proposed action would not significantly affect any federally listed threatened or endangered species.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action has been identified by the Bureau of Reclamation (BR) and the Department of Water Resources (DWR) as the signing and implementation of the Coordinated Operation Agreement. The COA consists of 22 articles and six exhibits:

- Article 1, Preamble
- Article 2, Explanatory Recitals
- Article 3, Definitions
- Article 4, Term of Agreement
- Article 5, Facilities
- Article 6, Coordination of Operations
- Article 7, Forecasting
- Article 8, Water Measurement Responsibilities
- Article 9, Reduction in United States and State Exports
- Article 10, Exchanges, Conveyances, and Purchases of Water Supply
- Article 11, Delta Standards
- Article 12, Monitoring
- Article 13, Records
- Article 14, Periodic Review
- Article 15, Relation to Agreement of May 16, 1960
- Article 16, New Facilities
- Article 17, Project Service Areas
- Article 18, Third Party Rights Unaffected
- Article 19, Effect of Waiver of Breach
- Article 20, Equal Employment Opportunities
- Article 21, Contingent Provisions
- Article 22, Officials not to Benefit.

- Exhibit A Standards for the Sacramento-San Joaquin Delta
- Exhibit B-1 Central Valley Project and State Water Project Annual Supplies
- Exhibit B-2 Central Valley Project and State Water Project Full
Development Annual Supplies
- Exhibit C Monitoring Locations
- Exhibit D Exchange Procedure to Provide D-1485 Condition 3
Replacement Water (Article 10b of COA)
- Exhibit E Water Shortage and Apportionment.

Implementing the COA would accomplish the following:

1. Commit both the CVP and SWP to meet D-1485 water quality and outflow standards for the Delta.
2. Require quantification of annual water supplies of the CVP and SWP.

3. Establish new sharing formulas: 55 percent CVP, 45 percent SWP when adding to export or storage; and 75 percent CVP, 25 percent SWP during periods of storage withdrawal.
4. Establish exchange arrangements under which the CVP and SWP convey water, and require negotiation between the two parties for conveyance and purchase of CVP water.

The BR and DWR have identified the no-action alternative as not implementing the COA. A probable future in that case is that both projects would be operated per the draft COA, except that BR compliance with the State's Delta standards would not be assured in critically dry years. In such years, the BR might only meet the standards contained in contracts with the Delta-Mendota Canal users. Those water quality standards, known as the Tracy standards, are less stringent than the D-1485 standards. The DWR would have three options in the event that the BR chose to meet only the Tracy standards in critically dry years. These would be to (1) meet Tracy standards (2) contribute the State's share toward meeting D-1485 standards, or (3) independently meet the entire D-1485 standards. Thus, there are actually three scenarios under the no-action alternative. Implementing the proposed action would reduce the potential annual firm yield of the CVP and SWP by about 130,000 and 200,000 acre-feet, respectively, assuming that both the CVP and SWP under the no-action alternative were to meet only Tracy standards. If, however, DWR opted under the no-action alternative to meet the SWP's share of D-1485 standards, the SWP annual firm yield would decrease by only 143,000 acre-feet. Since neither BR nor DWR has identified the most probable of the three no-action scenarios, we have assumed that the proposed action limits the potential annual firm yield for the CVP and SWP by 330,000 acre-feet. The COA identifies a CVP firm yield estimated at 8.2 million acre-feet under full development (2020 conditions). As 7.3 million acre feet CVP firm yield are already under contract, this means that there would be an uncommitted firm supply of 900,000 acre-feet. There are no operation studies that describe the impacts of managing interim and intermittent water, thus we cannot quantify the environmental impacts of those operational actions. (Our interpretation of interim water is that it is "firmly developed" but is either not committed in long-term contracts, or, if committed, is not being used to the full contract allowance. Intermittent water is understood to be water that is not sold under long-term contracts because it is unavailable in dry years.)

In the absence of D-1485, the BR's target standards for the Delta would likely be something less than the State standards (at a minimum the Tracy standards). Under that assumption, the effect of CVP operation on CVP-controlled reservoirs and river reaches would be quite different than under current operation wherein the BR endeavors to meet D-1485 standards whenever possible. In our opinion, the difference could be expressed in terms of yield of interim and intermittent water, a display of which is not provided by the operation studies. The no-action alternative that the BR and DWR have identified, however, is that the CVP would be operated to meet D-1485 standards in all but critically dry years. Since the proposed action would require the BR to meet D-1485 standards in all years, not just extremely dry years, it is our view that the no-action operation studies used for analysis are inappropriate.

The CVP and SWP are operated on a basis of supply and demand for agricultural, municipal, and industrial uses, taking into account flood control, navigation, power

generation, fish and wildlife, and recreation. Risk involved in assessing what the water supply is, or will be, is an unavoidable element in decision-making on water flow management. Because of the many competing needs there are not always firm guidelines for day-to-day management of water projects; thus, operation studies cannot address the impacts of short-term operation decisions. When supply exceeds demand there is opportunity to operate flexibly. Such was the case in 1978 when D-1485 was adopted and the Secretary of the Interior determined that the CVP could be operated, for the interim at least, to meet those standards in all but the driest years. Such decisions have an impact. In the case of D-1485 the impacts were beneficial (as intended) in the Delta, but unintentionally adverse in certain river reaches. The adverse impacts to rivers occur in all years, although they are most pronounced during and immediately following critically dry years. Impacts occur on a daily basis even in years of above-normal water availability. Mean monthly operation studies do not account for these occurrences, however. Fish population levels for an extended period could be determined by only a few hours of low flow. For example, a 12-hour flow of 500 cfs during a month having an average flow of 10,000 cfs could effectively limit population levels to that which can be supported by a flow of 500 cfs.

A major purpose of the proposed action is to afford environmental protection to the Sacramento-San Joaquin Delta, specifically through maintenance of water quality and outflow standards that protect fish and wildlife resources. The protection provided for Delta resources would be an improvement over that which existed before the administrative action taken by the Secretary of the Interior in 1978, and that which would exist in the future without the proposed action, but would not allow for fish and wildlife levels that might have persisted in the absence of the CVP and SWP.

A 1978 written decision of the Secretary of the Interior intended not only to enter into a COA, but also to have legislation enacted that would amend the Central Valley Project authorization to: (1) clearly provide as a project purpose the conservation and development of fish and wildlife resources, with associated costs of new (post 1978) water supplies for fish and wildlife designated as non-reimbursable, and (2) assure a guaranteed water supply to Central Valley national wildlife refuges. Those objectives are not provided for under the proposed action.

The only alternatives reported on herein are the proposed action and no action alternatives. Two other alternatives ("modified agreement" and "no coordination") are not addressed in this report because they have not been sufficiently defined by the BR and DWR.

THE AFFECTED ENVIRONMENTS

Fish and wildlife habitats that would be affected by the proposed action occur in (1) the Sacramento-San Joaquin Delta — its waterways, agricultural lands, and Suisun Marsh, (2) the Central Valley — especially CVP/SWP-controlled rivers and reservoirs, and CVP/SWP water service areas, (3) the San Francisco Bay system upstream to the western boundary of the Delta, and (4) the Trinity River basin — principally Clair Engle and Lewiston Lakes and reaches of the Trinity River.

The entire Sacramento-San Joaquin Delta would be affected by the proposed action. The State Water Resources Control Board's Decision 1485, which in large part instigated the need for the proposed action, was intended to provide greater protection for agricultural, municipal and industrial water supplies, and for fish and wildlife resources in the Delta. The Delta is a 700,000-acre expanse encompassing about 510,000 acres of farmland on 60 major islands. Since much of the farmland is below mean sea level (as much as 20 feet below), 1,100 miles of levees are needed to protect the islands from the 700 miles of tidal Delta waterways. Production of grain, hay, and pasture account for much of the agricultural use.

California's Central Valley measures roughly 40 miles in width and 450 miles in length and is comprised of the Sacramento Valley in the north and San Joaquin Valley in the south. Agricultural development has been largely responsible for the loss of about 95 percent of the valley's original 4 million acres of marshlands. Woody riparian habitat has fared even less well, having been reduced to only 2 percent of the historical acreage. Other natural habitats in the Central Valley are also scarce. CVP agricultural service areas total about three million acres. SWP agricultural service areas are less extensive but include lands outside the Central Valley.

CVP/SWP-controlled reservoirs and rivers are shown in Figure 1. All or portions of the three largest rivers in the Sacramento Valley (the Sacramento, Feather and American) have had their flow and temperature regimes significantly affected by either the CVP or the SWP.

The San Francisco Bay system would be affected by the proposed action from the mouth of the Bay at the Golden Gate to the western edge of the Delta. This area encompasses about 270,000 acres of open bay and about 85,000 acres of surrounding tidal marsh and mudflat. Depending on freshwater runoff conditions, the estuary can vary in salinity from nearly marine to almost fresh conditions.

In the Trinity basin Clair Engle and Lewiston Lakes and the Trinity River would be affected. Since the Trinity River is tributary to the Klamath River, the proposed action could conceivably impact the Klamath system; however, the impacts would likely be negligible.

Figure 1: MAJOR FEATURES OF THE SWP AND CVP



RESOURCES WITHOUT THE PROPOSED ACTION

Delta

Fishery resources using the 700 miles of Delta waterways include both anadromous and resident fishes. The most important of the anadromous fishes are chinook salmon, striped bass, American shad, and white sturgeon. Fish habitat and populations are much reduced from pre-CVP/SWP levels.

Chinook salmon pass through the Delta on their way to spawning sites in the rivers and stream of the Central Valley. Upstream migrants now number only about 250,000 annually on the average, varying widely from year to year. Most ascend the Sacramento River system. The Delta is believed to play a significant role in the rearing of juvenile chinook salmon in some years, and in all years the Delta environment has much to do with the overall survival of downstream migrant salmon and the upstream migration of adult salmon. Water quality, food availability, channel velocities, circulation patterns, water diversions, and predation all interact to affect fish survival.

Adult striped bass, once numbering about three million in the early 1960's, have declined to less than one million. The striped bass fishery is a complex estuarine-based resource, the management of which requires an understanding of their water quality and quantity needs, transport mechanisms, food base, and other factors. In recent years the correlation between a computed index (based on measurable environmental variables) of young-of-the-year striped bass and observed levels has been poor, with the observed levels (i.e., net samples) being much lower than computed levels. On 1985 the actual index was 6.3. Environmental variables indicated it should have been about 30. Previous ranges were from 10 (1977) to 120 (1965 and 1967). The understanding of this problem is poor.

From 1.5 to 2.5 million adult American shad migrate through the Delta enroute to freshwater spawning sites, primarily in the Sacramento River system. The Delta is an important rearing area for juvenile shad.

The 1979 population estimate of legal-sized white sturgeon was 75,000 fish. Adult sturgeon pass through the Delta on their spawning runs and the Delta is also an important rearing area for juveniles.

Resident fish species, particularly the white catfish, are numerous and important to the sport fishery.

Wildlife species in the Delta are associated with both farmlands and waterways. Migratory birds that winter in the Delta, often feeding on agricultural lands, constitute the most important use of this area by wildlife. Suisun Marsh, a 55,000-acre wetland complex in the western Delta, is an especially important waterfowl area.

Central Valley

There is some quantitative information on fish resources of CVP- and SWP-controlled rivers and reservoirs, but comparable information on wildlife is lacking. There are no reliable quantitative descriptions of fish and wildlife resources of the CVP and SWP water service areas (i.e., where water is consumed). Qualitative information, such as what types of fish and wildlife comprise various terrestrial and aquatic communities in the service areas, does exist, however.

Two major Central Valley rivers, the Sacramento and American, that are controlled by the CVP support important fish resources; chinook salmon, steelhead trout, American shad, and striped bass. Salmon in particular could decline substantially in the next 40 years under the no-action alternative as use of developed water supplies reaches the ultimate-use level. Current planning activities and hoped for improvements, however, should bring about a restoration of salmon habitat and populations, particularly in the Sacramento River between Keswick and Red Bluff Dams. There are no estimates of what those future levels of salmon are expected to be but hopefully they will be more than doubled in the Sacramento River. Corrections ultimately anticipated include improvement of salmon passage at Red Bluff Diversion Dam, a reduction in pollution emanating from the Spring Creek drainage, improved production of salmon and steelhead trout at Coleman Hatchery and Tehama Colusa Fish Facility, temperature control for releases at Shasta Dam, etc. An important aspect of the Sacramento River is that it supports four races of chinook salmon (fall, late-fall, winter and spring). Present spawning escapements average about 127,000 and 47,500 fish for the Sacramento and American Rivers, respectively.

The main SWP-controlled river is the Feather. Salmon spawning escapement averages about 50,000 fish annually. We have no data to indicate whether or not resource levels would change during the period of analysis for the no action alternative. Because the SWP is short of developed water supply, we suspect that existing water use from the Feather will change little under ultimate conditions, unlike CVP-controlled rivers.

In addition to salmon, portions of these major rivers support steelhead trout, striped bass, American shad, sturgeon, lamprey, trout and other fishes. Most of these resources are highly valued. These other species are not dealt with in detail in this report because impacts of the proposed action are likely very small to negligible and the biological information and operation studies available with which to analyze the impacts are inadequate.

The fish resources of CVP- and SWP-controlled Central Valley reservoirs that would be affected by the proposed action, primarily in Shasta, Folsom, and Oroville Lakes, are resident warm- and cold-water fishes. Collectively, these three reservoirs total about 53,500 surface acres and support significant angler use.

Other reservoirs that could possibly be affected by the proposed action are San Luis, Natoma, Thermalito, Keswick, and Whiskeytown. All but San Luis are re-regulating facilities for major storage reservoirs. Because of the low potential for impacts we have not discussed the resources of these waters.

Wildlife associated with rivers, reservoirs and water service areas include mammals, reptiles, amphibians, and both resident and migratory birds.

San Francisco Bay System

The estuarine and marine fish and wildlife resources that use the Bay complex could change significantly by 2020 under the no-action alternative. Further depletion of Delta outflow/Bay inflow on the order of a few million acre-feet is possible. Compared with a current Bay inflow averaging about 15 million acre-feet per year, and a pre-water development average of over 30 million acre-feet, this would be a significant change. The effects of reduced fresh water inflow are being studied but results are several years away. The effect of reduced outflow to San Francisco Bay causes significant physical and biological changes; the ecological significance is not completely defined, however. A good reference on this is Technical Report No. 7 of the Four-Agency Ecological Study Program in the Bay-Delta Estuary, Herrgesell et al., 1983, titled "Effects of Fresh Water Outflow on San Francisco Bay Biological Resources". Present guidelines for freshwater inflow call for surges in Delta outflow of at least 10,000 cfs within a 5 to 10-day period on an average of four times per year, and at least once yearly during dry years (Water Quality Control Plan, Sacramento-San Joaquin Delta and Suisun Marsh, August 1978, State Water Resources Control Board).

Trinity River Basin

Clair Engle and Lewiston Lakes, and 40 miles of Trinity River from Lewiston downstream to the North Fork Trinity confluence, are the waters of the basin that would be affected by the proposed action. Neither wildlife nor lake fisheries would be significantly affected, so only the fish resources of the Trinity River are addressed herein. Under the no-action future, we would expect substantial increases in the anadromous fishery. The goal of the recently funded, \$57-million Trinity River Basin Fish and Wildlife Management Program is restoration of the basin's natural resources, especially salmon. Restoration could bring about a several-fold increase in the existing level of about 10,000 salmon spawners.

RESOURCES WITH THE PROPOSED ACTION

Delta

An analysis of impacts of the proposed action on Delta fish and wildlife resources was provided by the California Department of Fish and Game. Quantification of impacts in terms of fish numbers or fish habitat alteration was not provided, but impacts were described in terms of "better" or "worse". Fish resources considered were striped bass, salmon, and resident fishes. Analysis of wildlife resources focused on Suisun Marsh as that is where the most measurable effects would occur.

With respect to striped bass, the proposed action would:

1. Keep salinity in the lower San Joaquin River within the range preferred for spawning in critically dry periods.
2. Keep the estuarine entrapment zone in Suisun Bay, thereby providing for greater food supply, and
3. Keep reverse flows in the lower San Joaquin River at about 800 cfs in critically dry years, rather than at 2100 cfs.

With respect to salmon, the proposed action would:

Keep flow reversals in the lower San Joaquin River to a minimum, thereby promoting positive migration of juvenile chinook.

In general, critical-year operation of the CVP and SWP would be beneficial to Delta migratory fishes and harmless to resident fishes.

Impacts on Delta wildlife would be negligible with the proposed action except in Suisun Marsh where, given the existing water control facilities in the marsh, the production of alkali bulrush seeds (a major food item of waterfowl) would be about 20 percent higher in critically dry years.

Central Valley

The proposed action would have a net adverse effect on fish and wildlife resources in the CVP/SWP service areas if it results in the contracting of more firm water. The Fish and Wildlife Service is of the opinion that the contracting of firm water to already-developed agricultural lands is adverse to fish and wildlife because in many cases it allows the freeing up of groundwater that is used to convert undeveloped or partially developed lands to a more intensive agricultural use and eventually the owners of those lands seek and obtain a firm surface supply. Impacts could vary widely for individual contracts and would be the subject of separate analyses and environmental documentation.

Implementation of the proposed action would affect certain reservoirs, rivers, and floodplain lands in the Sacramento, Feather and American drainages, but for all practical purposes, reservoir fishery and terrestrial wildlife habitats are not expected to be significantly affected. The adverse impacts on river fisheries can be assessed and are, in fact, the most significant attributable to the proposed action. Water temperatures and flow rates in rivers immediately below CVP- and SWP-controlled reservoirs are the principal environmental factors that would be changed. River temperatures would change because of: (1) different patterns in reservoir storage and therefore release elevation relative to lake surface, and (2) different river flows and therefore differences in the water's time of travel. Relative to the no-action alternative, the proposed action would cause small but at times highly significant changes in the temperature of water released from the major storage reservoirs. Changes in water temperatures due to altered storage levels could be considerably more significant than changes in river flows. Impacts were assessed from analysis of monthly reservoir and river operation studies and water temperature studies based thereon. Operation studies were provided by the BR and DWR; BR alone supplied the water temperature studies.

Severe adverse impacts to the Sacramento River would occur during critically dry periods, and the periods immediately following when Lake Shasta would be refilling. The proposed action would cause slightly increased spring flows, decreased winter flows, and lower lake levels overall. The impact of the flow changes on fish has not been quantified because there has not been a study of the relationship of flow to fish habitat in the Sacramento River. Thus, judging the adverse effect of flow changes alone on fish habitat and fish populations must remain speculative.

Implementation of the proposed action would increase the temperature of water released from Keswick Dam (the re-regulating reservoir for the Shasta-Trinity operation) during the months of May through November. During these times water temperatures are presently often marginal to unsuitable for salmon. In a 1933-type year, i.e., a "worst case" critically dry year, the proposed action would cause a rise of up to 1°F at the 1980 level of development and up to 4°F at the 2020 level of development. The 2020 level projections reflect absolute temperatures of 59, 62, 62, and 59°F for the months of July through October; much too warm for salmon spawning and egg incubation. An analysis performed by the BR and presented in the September 18, 1985 DEIS/EIR is based on a mathematical model incorporating hydrological parameters and biological parameters (provided by the Fish and Wildlife Service) and expresses losses with the proposed action as a percentage that would occur in a 1933-type water year. The Fish and Wildlife Service has further used this data to estimate that adult spawning escapement would be reduced by 3,500 and 7,600 salmon, respectively, at 1980 and 2020 levels of development. Important to note is that 1,400 and 5,000 of the fish lost (1980 and 2020 conditions, respectively) would be winter-run chinook salmon, a race designated as Resource Category 1 for which the mitigation goal is no loss of existing habitat value. For the last 3 years the spawning escapement of winter-run chinook salmon has averaged only 2,000 fish. Loss of salmon in other types of water year has not been estimated. An annualized figure for the loss of salmon due to the proposed action cannot be determined.

Impacts of the proposed action on Feather River fishery resources would be minor. Selective level intakes to the outlet at Oroville Lake reach deep into the pool and can provide water of suitable temperature under all, or nearly all, reservoir storage conditions. Changes in flow to the Feather River would be small and the impact on salmon habitat could perhaps be slightly beneficial.

Impacts of the proposed action on the American River fishery would be significant. The action would cause Folsom Lake levels, on the average, to be 3 to 25 feet lower in 16 out of every 600 months. This would occur at times when water temperatures are critically important to salmon. Although the intake to the outlet at Folsom Lake has multiple-level selectivity, water of suitable temperature cannot always be reached. The impact of unsuitable temperature in a 1933-type water year could equate to a loss of several thousand adult salmon. The impact on salmon of flow-rate changes would be negligible.

San Francisco Bay System

The proposed action would lessen peak Delta outflow/Bay inflow during winter in critically dry years and the year or years immediately following critically dry years. This would have an adverse impact on Bay fishes and, to a lesser extent, Bay wildlife. Average Delta outflow/Bay inflow would be slightly higher during summer and fall in critically dry years with the proposed action and therefore slightly beneficial to the Bay. The net effect of the proposed action would be adverse. The Bay complex is a system that best functions ecologically under naturally varying hydrologic conditions. High flows to the Bay flush pollutants, beneficially alter salinity, transport larval fish and shellfish to more desirable areas for growth, etc.

Trinity River Basin

Releases to the Trinity River from Lewiston Reservoir are presently near fully controlled. The proposed action and the no-action alternative thus do not differ in river flows. Because of exports from the Trinity River basin to the Sacramento basin, however, storage levels in Clair Engle and Lewiston Reservoirs differ between the two alternatives, causing differences in the temperature of the release water to the Trinity River. Temperature increases under the worst case condition (i.e., 1933) would be 1, 3, and 4°F, respectively, for the months of August, October, and November at the 1980 level of development, reflecting absolute water temperatures of 62 and 61°F during October and November; much too high for survival of salmon at spawning. At the 2020 level of development, the proposed action would cause an increase of 1°F during the month of October under the worst case condition, reflecting an absolute water temperature of 49°F — not a problem for salmon. Temperatures in other months would not be affected by the proposed action. Temperature increases in the fall at the range of 57°F and above are especially harmful to spawning salmon. In the months of October and November of the worst case condition, at the 1980 level of development, the impacts would be such that a major fraction of the upper river salmon spawn would be lost. Also, operation of Trinity River hatchery would be impaired. The number of adult equivalents lost could be on the order of several thousands of fish, depending on the level of restoration that will have taken place because of the Trinity River Basin Fish and Wildlife Management Program. Wildlife resources of Clair Engle and Lewiston Reservoirs, and wildlife resources associated with the Trinity River, would not be significantly affected.

DISCUSSION

The decision of the Secretary of the Interior in 1978 relative to the Delta Water Quality Control Plan and the COA was that, among other things, the Secretary would propose legislation to Congress that would:

1. Authorize the CVP to meet State standards.
2. Authorize the relocation of the Contra Costa Canal intake
3. Amend the CVP authorization to clearly provide that:
 - a. conservation and development of fish and wildlife resources, and maintenance of the quality and quantity of all waters affected by the project, including the estuary, are authorized purposes of the CVP, with the objective of maintaining fish and wildlife at recent historical (1922-1967) levels, and
 - b. equal consideration be given to fish and wildlife in the development and allocation of any new water supplies, and that all costs for such water be non-reimbursable.
4. Authorize provision of a guaranteed water supply to Central Valley national wildlife refuges.
5. Authorize the implementation of a Coordinated Operation Agreement between the Bureau of Reclamation and the California Department of Water Resources for operation of the Central Valley Project and State Water Project.

The Secretary further directed no additional commitment for sale of CVP water until the issue of instream flow needs in the areas of origin has been resolved and until the water needs of Central Valley national wildlife refuges have been met.

The Secretary's 1978 decision set forth a comprehensive solution to many of the problems and issues that have surrounded both the Central Valley Project and the State Water Project. To date, however, none of the points addressed in that decision have been pursued to any extent by the BR except the Coordinated Operation Agreement. The present proposal to seek authorization for implementing the COA does not address those other issues. Moreover, if the COA is implemented alone, it may preclude satisfactory resolution of several of those issues. Of greatest concern to the Service are the matter of instream flow needs (quality and quantity) of all waters affected by the CVP, and the issue of water for refuges. We feel very strongly that the comprehensive approach provides the only equitable means for achieving solution to those issues. Conversely, we feel that any further commitment of CVP water in the absence of a comprehensive solution is counterproductive.

Based on our analysis of the available fish and wildlife information and the Bureau of Reclamation's description of the proposed action, implementation of the COA would impact fish and wildlife resources in five ways.

1. Beneficially impact striped bass and salmon habitat in the Sacramento-San Joaquin Delta. This would come about through a more favorable salinity level for striped bass spawning in the lower San Joaquin River; maintenance of the location of the nutrient entrapment zone in Suisun Bay; and, to the benefit of both striped bass and salmon, reduced magnitude of flow reversal in the lower San Joaquin River. The degree of beneficial impact has not been quantified. In the last seven years actual numbers of young-of-the-year striped bass have been significantly lower than the levels predicated by river flows and diversion rates — about 1/3 to 1/2 of the predicted levels. The fact that striped bass numbers have declined in the last seven years even though D-1485 standards have been in effect and met cautions us that the beneficial effect of D-1485 standards may not accomplish what they were intended to.
2. Beneficially impact waterfowl habitat in Suisun Marsh. A benefit would be realized in critically dry years with the proposed action due to the availability of better quality water for distribution to the marsh. The seed production of waterfowl food plants would thus be 20 percent higher in critically dry years than would be the case under the no-action alternative.
3. Potentially Adversely impact fish and wildlife habitat in Federal and State water service areas. The impact of the proposed action would be adverse if it made additional project water available for irrigation. Both the amount and quality of habitat suitable for fish and wildlife would diminish as more land is put to agricultural use and as that land already farmed is used more intensively.
4. Potentially Adversely impact fish and wildlife habitat in San Francisco Bay. The overall reduction of flow into San Francisco Bay made possible with the proposed action would, in the opinion of the Fish and Wildlife Service, be detrimental to fish and wildlife resources. The adverse impact could be

avoided by allowing sufficient Delta outflow to maintain Bay hydrodynamics and water quality. Some of the compensatory measures identified for salmon would benefit the Bay. For example, operating for higher storage levels so that water releases would be of more suitable temperature would reduce winter storage capabilities, and that would mean more releases for the purpose of flood control and hence more uncontrolled outflow to the Bay. The COA does not preclude uncommitted yield from being used for San Francisco Bay fish and wildlife, but the highly improbable that it would ever occur.

5. Adversely impact salmon habitat in the Sacramento, American and Trinity Rivers. Multiple-level intakes to the outlets at Shasta and Clair Engle Lakes are needed for temperature control with the existing project operation, and the need would be even greater with the proposed action. Given existing outlet facilities, the only way to avoid the adverse river water temperatures attributable to the proposed action would be to manage reservoir storage levels so that water of suitable temperatures could be released. In the event of a series of dry water years, however, that measure might not be possible. For the Sacramento River, the impact of the proposed action could extirpate the winter-run race of salmon and further decimate the spring and fall runs.

The flows that would be provided to the Sacramento and American Rivers at full development under both the no-action and proposed action alternatives would be inadequate for salmon and other anadromous fishes. This is because the minimum flows agreed to at the time the Shasta project was constructed in the 1940's and the Folsom project in the 1950's do not provide reasonable instream habitat and do not always allow the necessary water temperatures be maintained throughout the important reaches. Minimum allowable flows in the Sacramento River below Keswick Reservoir range from 2,300 to 3,900 cfs under normal conditions, and during critically dry years, 2,000 to 2,800 cfs. Given the present agreement for the American River, the minimum flow could become, as the operation studies reflect, 250 cfs (increased to 500 cfs during the salmon spawning season). Whereas the minimum flows are now a rare occurrence they will be commonplace at the 2020 level of development when full use of storage is made. The proposed action would increase the frequency at which inadequate flows occur. The minimum flows adopted years ago could thus soon become the maximum flows for much of the year.

The adopted minimum flows are not capable of maintaining salmon and other anadromous fishes of the Sacramento and American River at even present levels. Until a fishery flow needs study for the Sacramento River is completed the Fish and Wildlife Service believes that an interim minimum flow from Keswick Reservoir to the Sacramento River of 6,000 cfs is needed. A much needed study is underway that will make flow needs a fact, not an opinion. For the American River, the FWS has completed a flow needs analysis as part of the BR's Auburn-Folsom South/Lower American River Alternatives Study (Flow Needs of Chinook Salmon in the Lower American River, Fish and Wildlife Service, May 1985). The analysis shows that the lowest flows in the American should be 1,750 cfs during the fall spawning period; 1,250 during the spring rearing and outmigration period (plus additional flow as necessary to keep river temperature suitably low); not less than 800 cfs from July 1 through March 31; and a 60,000 acre-foot block of water additional to be released on an as-needed basis for upstream and downstream migration of salmon in the American River.

In addition to the vulnerable winter-run salmon in the Sacramento River, the salmon and steelhead trout of the Trinity River require special attention in light of the recently initiated Trinity River Basin Fish and Wildlife Management Program, and especially in view of the Trinity River Division's authorizing statute. That authorization (Trinity River Act, P.L. 84-386) provides that, notwithstanding the purposes of the project, the Secretary is "...authorized and directed to adopt appropriate measures to insure the preservation and propagation of fish and wildlife, including, but not limited to, the maintenance of the flows of the Trinity River...". This essentially requires the Department to operate the Trinity River Division so that no net adverse effect to Trinity River fish and wildlife occurs.

Consonant with the Secretary of the Interior's 1978 decision and rationale relative to maintaining fish and wildlife resources at recent historical levels is the need to provide a guaranteed water supply for Central Valley national wildlife refuges. These refuges, administered by the Fish and Wildlife Service, have a firm water supply of only about 22,000 acre-feet, most of which must be pumped from groundwater at considerable cost. The annual need is 211,000 acre-feet. When CVP interim and intermittent water is no longer available these refuges will have to rely totally on their own firm supply unless firm CVP water is provided. Today, only 4 percent of the Central Valley's historical 4,000,000 acres of wetlands remain. The need for a firm water supply for Central Valley national wildlife refuges is great; the intent of the Secretary in 1978 was to guarantee that supply. The COA might preclude, or at least make more difficult, committing CVP supply for this purpose since it requires the BR to negotiate the sale of CVP water to the California Department of Water Resources (Article 10). The Federal refuges alone cannot provide habitat sufficient to maintain wintering migratory waterfowl and waterbirds of the Pacific Flyway; all Federal, State, and private wetland habitats are needed for this purpose. The Central Valley provides 60 percent of the Pacific Flyway's waterfowl wintering habitat. Waterfowl are an international resource protected by Migratory Bird Treaties, one in 1916 with Great Britain (for Canada) and another in 1918 with Mexico.

Management of the State-administered areas, like the federally administered areas, is constrained by inadequate supplies of water. For that reason, this report includes a recommendation that CVP water be furnished to meet the needs of the State's Los Banos, Mendota, and Gray Lodge Wildlife Management Areas. In recent years, privately owned wetlands in the Grasslands and Butte Sink areas of the Central Valley have been placed in the Service's Easement Acquisition Program. Management of these historically important waterfowl habitats is also constrained by a deficient water supply. The water requirements for all Federal- and State-administered areas, including non-easement areas within the Grasslands Resource Conservation District and the Butte Sink Area, are presented in Table 1. At this time, the BR should commit firm surface supplies to meet the full need of these Federal and State wildlife areas.

Table 1.
ANNUAL CLASS 1 WATER REQUIREMENTS
 for
FEDERAL, PRIVATE AND STATE MANAGEMENT AREAS
 in the
CENTRAL VALLEY

<u>AREA</u>	<u>REQUIREMENT (A.F.)</u>
<u>FEDERAL</u>	
Sacramento NWR	50,000
Delevan NWR	30,000
Colusa NWR	25,000
Sutter NWR	30,000
San Luis NWR	19,000
Merced NWR	16,000
Kesterson NWR	10,000
Kern NWR	25,000
Pixley NWR	<u>6,000</u>
SUB TOTAL	211,000
 <u>PRIVATE</u>	
Grassland Resource Conservation District	195,000
Butte Sink Area*	<u>51,000</u>
SUB TOTAL	246,000
 <u>STATE</u>	
Los Banos WMA	25,000
Mendota WMA	19,000
Gray Lodge WMA	<u>34,000</u>
SUB TOTAL	<u>78,000</u>
GRAND TOTAL	535,000

* - As defined by the Fish and Wildlife Service in their Butte Sink Ascertainment Report.

Operation of the national wildlife refuges and fish hatcheries in the Central Valley is energy-intensive. In a hot, dry year as many as 10 million kilowatt-hours of electricity are required to operate the water chilling, heating, and treatment systems at Coleman National Fish Hatchery and the water requirements of the national wildlife refuges in the Central Valley. Escalating electrical energy costs are limiting the operation of these systems to less than the optimal level.

Examples of the urgent need for project power are as follows. The Coleman National Fish Hatchery was authorized as a part of the CVP as partial mitigation for the loss of natural spawning grounds caused by the construction of Shasta and Keswick Dams. However, unlike other project facilities, the Coleman hatchery has yet to be provided project power. Although the hatchery has a small allocation of preference power for the period 1982 to 1994, the allocation is insufficient for the operation of the chillers which are used to cool water for holding adult winter chinook until they are ready to spawn. Under terms of a 1955 Memorandum of Agreement, BR transferred \$48,000 to the FWS for construction of wells to provide

groundwater for wetland maintenance at Merced National Wildlife Refuge. However, the escalating cost of commercial electricity to operate the pumps has resulted in a situation where the optimal wetland acreage at Merced can no longer be maintained.

The provision of project power to the fish and wildlife facilities in the Central Valley would help compensate for the loss of natural spawning grounds, stabilize the decreasing wetland acreage, provide crop damage relief, and help meet treaty commitments to manage and preserve migratory waterfowl. The amount of energy required would range from only 0.03 percent to 0.1 percent of the annual CVP generation.

We believe that our assessment of the impacts of the proposed action on fish and wildlife resources is conservative for the following reasons.

1. Numerous assumptions are implicit in the impact analysis as well as in the studies of hydrology and river water temperature. The proposed action will mean, among other things, a decision that the CVP will be operated to meet D-1485 standards in all years, including critically dry years. Yet, the only operation studies available to us are based on the assumption that the no-action alternative would mean meeting D-1485 standards in all but critically dry years. Our analysis, therefore, only quantifies the impact of meeting D-1485 standards in critically dry years. In the absence of a no-action alternative that involves meeting some other standard in all years, presumably Tracy standards, we could not perform the analysis we believe to be correct.
2. Monthly hydrology and water temperature operation studies were utilized to assess impacts on fish and wildlife. Fishery resources are often limited by extreme conditions that occur on a daily or instantaneous basis — instantaneous flow or temperature conditions can be quite different from average monthly conditions. Average monthly water temperature and instantaneous water temperature can vary by 10°F or more. Certain life stages of salmon have a low or "normal" mortality rate at 56°F but suffer total mortality at 62°F. In some years marginal and limiting temperatures occur in the Sacramento, Trinity and American Rivers under existing conditions — the proposed action would worsen the mortality rate.
3. Time was insufficient for collection of all information needed. The relationship of flow and temperature to Sacramento River salmon habitat, and the relationship of Delta outflow to San Francisco Bay fish and wildlife habitat, are obvious examples. Although Federal action on the COA has been anticipated since 1978, agreement on a final draft was not reached until May 1985. There has been neither time nor funding to do an instream flow and water temperature needs study of the Sacramento River. While studies on the outflow needs of San Francisco Bay have been underway for several years, the results will not be available for some time.
4. Long term and cumulative effects of the proposed action could not be addressed, only short-term and direct effects. Data were sufficient to address only the worst-case condition as would occur in 1933. For rivers,

operation studies showed only 3 out of 83 years as having significant water temperature increases because of the proposed action. Chinook salmon have a life cycle such that they return as adults to freshwater at 2, 3, 4, or more years of age. If the freshwater phase of the salmon's life cycle could not be completed for 1 or 2 years, it would take many years for the affected population to rebuild. Such was the case with winter-run chinook salmon affected by the adverse water temperatures caused by the 1976 -77 drought. Population levels are still greatly depressed. If a population cohort were unable to reproduce itself for 2 or more consecutive years the result could be extirpation of the race.

There have been substantial losses of fish and wildlife habitat associated with units of the CVP. Chinook salmon have been extirpated from the San Joaquin River and greatly reduced in tributaries to the San Joaquin River — an overall reduction of about 90 percent. Almost all of the Central Valley's emergent wetlands and woody riparian has been lost due to water development and agriculture. None of Central Valley national wildlife refuges have been acquired or are operated as CVP mitigation features. In spite of this migratory waterfowl have persisted in fair numbers although public refuges supply only about 15 percent of their wintering habitat. The same can not be said for many wading, shore birds, and other wildlife. Central Valley woody riparian vegetation has been greatly diminished and not significantly mitigated. Untold numbers of migratory song birds and raptors have been lost in direct proportion to their habitat loss. All told, a vast array of migratory birds, anadromous fish, and resident fish and wildlife habitat and populations have been lost.

These losses can never be replaced given the present conditions in the Central Valley, but partial replacement is in order. For wetland and riparian dependent wildlife and stream dependent fish the key resource for habitat compensation is water — water supply for wetlands and riparian areas and instream flows for fish and other aquatic life. Without water, compensation is impossible. If these resources are to be in any way mitigated, water in significant quantities must be set aside for these purposes. The self imposed Departmental moratorium on CVP contracting should be continued until fish and wildlife needs are resolved. Jointly our two agencies, should be able to achieve such a resolution but not if needed firm water supplies are no longer available. A self imposed and jointly supported moratorium is a good administrative fish step to solving these fish and wildlife problems. I ask your support and assistance in seeking it.

RECOMMENDATIONS

The Fish and Wildlife Service therefore recommends that for mitigation of the impacts of the COA:

1. Multiple-level intakes to the outlet structures at Clair Engle and Shasta Lakes be provided to allow the best possible control of water temperature for protection of downstream fisheries.
2. Until multiple-level intakes to the outlet structures at Shasta and Clair Engle Lakes are in operation, storage be held at levels sufficient to assure that release water maintains the temperature in downstream reaches utilized by salmon for spawning and egg incubation at or below 56° F.

And in furtherance of a 1978 Secretarial decision to conserve fish and wildlife resources and specifically provide a guaranteed water supply to Central Valley national wildlife refuges, the Fish and Wildlife Service recommends:

3. Minimum flows from the Folsom Project to the lower American River be set at:
 - a. No less than 1750 cubic feet per second from Nimbus Dam to the Howe Avenue Bridge from October 15 to December 31, for spawning salmon;
 - b. No less than 1250 cubic feet per second from Nimbus Dam to the Howe Avenue Bridge from January 1 to March 31, for salmon incubation and rearing;
 - c. No less than 1250 cubic feet per second from Nimbus Dam to the mouth of the American River from April 1 to June 30, and such additional flow as may be required to prevent water temperature at the mouth of the American River from exceeding 65°F, for salmon rearing and out-migration;
 - d. No less than 800 cubic feet per second from Nimbus Dam to the mouth of the American River from July 1 to March 31, for all fishery purposes.
4. At least 60,000 acre-feet of water be reserved in Folsom Reservoir for release at the direction of the fishery resource agencies during the period October 15 to June 30 to facilitate upstream and downstream migration of salmon.
5. The minimum flow to the Sacramento River at Keswick be set at 6,000 cubic feet per second pending the results of a 2-year study of the relationship of river flows to fish habitat in the river. (The results of the flow study, presently being undertaken by the California Department of Fish and Game, will provide the basis for setting long-term minimum flows for protection of the fishery.)
6. A firm annual surface supply of 211,00 acre-feet of Class 1 water be furnished, on a non-reimbursable basis, to Central Valley national wildlife refuges.
7. A firm annual supply of 246,000 acre-feet of Class 1 water be furnished, on a non-reimbursable basis, to the Grasslands Resource Conservation District and Butte Sink Area to serve Migratory bird needs.
8. A firm annual supply of 78,000 acre-feet of Class 1 water be furnished, on a non-reimbursable basis, to the State of California's Los Banos, Mendota, and Gray Lodge Wildlife Management Areas.

9. A firm supply of power be provided, on a non-reimbursable basis, to Central Valley national wildlife refuges, State waterfowl management areas, and to Coleman National Fish Hatchery.
10. No further contracting of CVP firm supply for agricultural, municipal or industrial uses be undertaken until all fish and wildlife needs associated with the CVP have been identified, resolved, and solutions authorized.

DEPARTMENT OF FISH AND GAME

116 NINTH STREET
SACRAMENTO, CALIFORNIA 95814
(916) 445-3531



October 17, 1985

Mr. James J. McKeivitt, Field Supervisor
U. S. Fish and Wildlife Service
Division of Ecological Services
2800 Cottage Way, Room E-1803
Sacramento, CA 95825

Dear Jim:

We have reviewed your "Detailed Report on the Central Valley Project/State Water Project Coordinated Operation Agreement," prepared in compliance with the Fish and Wildlife Coordination Act. The report is a fine summary of fish and wildlife problems. We would, however, have preferred a document which, aside from the broader issues related to the marketing of water, distinguished more clearly the relatively small effects of the Coordinated Operation Agreement (COA) from the ongoing impacts of the Central Valley Project (CVP).

As you know, we consider our joint responsibilities under the Fish and Wildlife Coordination Act to be of paramount importance to protecting public trust and interest in fish and wildlife resources. It is clear to us that the intent of the law is that we each provide the Secretary of the Interior and the Congress of the United States a complete analysis of the probable impacts of a proposed project or modification of an authorized project and recommendations which are as specific as practicable for measures to mitigate or compensate for identified damages to fish and wildlife. In the instance of this particular report, we also share the responsibility of carrying out the 1978 directive of the Secretary of the Interior wherein we were asked to identify the instream flow needs in the areas of origin and to clarify the requirements for water at the Central Valley wetlands.

The Bureau of Reclamation, the Department of Water Resources, ourselves, and your agency have worked together to identify the most effective and economical means to solve these fish and wildlife problems associated with the construction and operation of the CVP and State Water Project (SWP). We believe the Secretary and Congress require the benefit of all our conclusions and recommendations. To that end, we offer the following comments:

1. In your presentation on "Resources without the Project for the Central Valley" you point to current planning and hoped for improvements. It is important to point out that the problems that are being studied are those caused primarily by the operation of the CVP. Further, funding for these studies, under the "Central Valley Fish and Management Study" is sponsored by the Bureau of Reclamation. The various studies are in several different stages of the Federal planning process. They all share one common constraint; in order for the corrective measures to be implemented, congressional authorization is required. Your report should reflect the uncertainty associated with this requirement and the probability of conflict if the remaining yield of the CVP is contracted under the COA.
2. In your discussion of resource categories, we suggest you add spring-run chinook salmon to category 1.

Impacts resulting from lack of spawning flows, lost gravel recruitment, high water temperatures, pollution, and barriers to migration have driven this run to near extinction.

3. In evaluating potential fish and wildlife impacts associated with water marketing under the COA, we must recognize that the amount, method, and timing of transport of marketed water could have far-reaching impacts on fish and wildlife. For example, the levels of reservoirs, the magnitude of their fluctuation and the temperature of water released downstream could be affected. In the Sacramento-San Joaquin river systems toxic materials may be insufficiently diluted (copper and zinc from Spring Creek), introduced (selenium from agricultural drainage), or insufficiently flush out as in the case of sand and silt on the Trinity River. Higher flows for irrigation deliveries could indirectly impact salmon by increasing the demand for more riprapping for bank protection. Nonstructural, operational solutions to fish passage at Red Bluff Diversion Dam could be impacted. Flow changes may also affect riparian zone, floodplains, and land use to the detriment of fish and wildlife.

Your analysis focuses almost entirely on probable impacts during critically dry years. It should be recognized that the COA, the current operation of the CVP, and future conditions, if more water is marketed, significantly restrict the opportunity of fish populations to take advantage of near optimal conditions



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 Southwest Region
 300 South Ferry Street
 Terminal Island, CA 90731

October 3, 1985

F/SWR33-RSCW-

Mr. Richard J. Myshak
 Regional Director
 U. S. Fish and Wildlife Service
 500 N.E. Multnomah Street, Suite 1692
 Portland, Oregon 97232

Admin _____

Budget _____

Tech. Asst. _____

Rec. Sys. _____

Dear Mr. Myshak:

I am responding to Jim McKeivitt's 9/25/85 request for our views concerning your Fish and Wildlife Coordination Act Report on the Coordinated Operation Agreement (COA). The COA would make possible more efficient operation of the Federal Central Valley Project (CVP) and the State Water Project (SWP). However, the coordination of water projects as specified in the COA would also have adverse impacts, if unmitigated, on salmon spawning and rearing in the upper Sacramento, American, and Trinity Rivers, and in San Francisco Bay. In general, we support your Coordination Act Report and concur in its conclusions and recommendations. We do think it would be appropriate to mention some of the past dissatisfactions the various resource agencies have stated regarding existing Decision 1485 water standards referenced in the text of the Report.

The coordination proposed in the COA is laudable. However, as you know, the relationships involved in this coordination are extremely complex, both for the operation of the water projects per se, and for the fish and wildlife that rely on Central Valley habitats. The Secretary of Interior recognized this, when he adopted Option 6 of the 1978 Decision Document. That decision made it clear that the Department of Interior intended to, among other things, implement a COA between the United States and the State of California. It also made clear the Department's intention to provide that:

"conservation and development of fish and wildlife resources, and maintenance of the quality and quantity of all waters affected by the project, including the estuary, are authorized purposes of the CVP...with the objective of maintaining fish and wildlife at recent historical (1922-1967) levels, and that equal consideration be given to fish and wildlife in the development and allocation of any new water supplies, and that all costs for such water be non-reimbursable."



The key element in maintaining the quality and quantity of anadromous fish habitat in the Sacramento-San Joaquin system is understanding clearly the relationship between flows and fish production. No comprehensive evaluation of fishery instream flow needs has been attempted - although the California Department of Fish and Game (CDFG) has just begun such a study. In addition, NMFS has just entered into a contract to develop a fish-flow-economics modeling tool to evaluate the value of Sacramento River flows for chinook salmon production. These evaluations should provide the basis for defining the flow regime required to protect the "quality and quantity" of anadromous fish habitat in the Sacramento River system.

Thus we see the COA and establishment of adequate fishery flows as part of a comprehensive approach to equitable solution of these issues. The COA does not in itself develop new water supplies, but it certainly facilitates diversion of additional water from the system. Consequently, we strongly support the mitigation measures discussed in your report. In addition, we urge the Department of Interior to incorporate into a comprehensive solution 1) a flow regime based on the results of CDFG's instream flow evaluation, 2) the tools to be developed in our salmon habitat valuation study, and 3) a complete reassessment of the adequacy of past CVP mitigation in the upper Sacramento River.

I believe we are at an important crossroad in the course of anadromous fisheries in the Sacramento River system:

- the CDFG fishery instream flow need study,
- the NMFS contract for "Determination of the Value of Chinook Salmon Habitat in the Sacramento River,"
- the reopening of D1485 standard hearings, thereby allowing existing inadequacies to be addressed,
- the development of the COA, and
- efforts to develop a comprehensive salmon management plan in the Sacramento River system.

Consequently it is important, now more than ever, that all of us ensure that our actions and recommendations are carefully crafted and do not preclude addressing the complex fish and wildlife, and water problems in a sound, comprehensive manner.

which would normally occur absent the large-scale diversions by the CVP. The proposed marketing will reduce the frequency and duration of such population rebuilding opportunities.

Existing law (D1485) regulates only the salinity in the San Joaquin River system relative to water diversion at the Delta. If the COA facilitates greater ratios or longer duration diversion rates at the Delta, it will result in increased entrainment and loss of juvenile salmon. Hopefully, agricultural drainage flows to the San Joaquin River will be decreased in the future and the salinity standards will be less important. However, a positive downstream flow sufficient to transport outmigrant salmon past the pumps and through the Delta is essential to the recovery of the San Joaquin system populations. This issue should be studied and recommendations should be prepared.

4. Relative to your specific recommendations: They are similar to those which we intend to make at the time it is proposed that any water made available by the COA is to be marketed. We expect the current studies being conducted by your agency, the Bureau of Reclamation, and ourselves to be completed soon. We will be in a position to clearly identify the most effective and efficient means available to solve the currently unmitigated fish and wildlife problems caused by the CVP.

Your recommendation that no further contracting of CVP firm supply be undertaken until fish and wildlife needs have been identified and solutions authorized is particularly important. If, for example, the Secretary of the Interior chooses to continue the current moratorium on contracting CVP water until fish and wildlife issues are resolved, it would be one way of ensuring consistency with the position of our Department on the COA, a position we expressed to Congressman Miller in June of 1986. It is our intent to focus on the water marketing plan and its authorization as the point where fish and wildlife impacts of the entire CVP will be addressed and resolved.


It is our understanding from discussion with Department of Water Resources, Bureau of Reclamation, and others that congressional approval of the COA will not preclude these considerations for fish and wildlife at that time.

Under the California Environmental Quality Act and the National Environmental Policy Act both the State and Federal water development agencies will be required to

fully disclose the environmental impacts of not only the current change in the projects but with the early construction and ongoing operation. If these impacts are to be mitigated, yield of the projects must be available.

We appreciate this opportunity to comment. We believe that implementation of your recommendations will move us all forward toward eventual restoration of fish and wildlife.

Sincerely,


Jack C. Parnell
Director

cc: Department of Water Resources
U. S. Bureau of Reclamation

Thank you for the opportunity to review and comment on your report.

Sincerely yours,

EC Fullerton
E. C. Fullerton
Regional Director

cc: CDFG, D. Lollock
FWS, J. McKeivitt

FEB 14 1986

MP-780

To: Regional Director, U.S. Fish and Wildlife Service,
Portland, OR

From: ~~Acting~~ Regional Director, Sacramento, CA

Subject: Review of Coordination Act Report on Coordinated Operation
Agreement

We have reviewed the subject Report on the Coordinated Operation Agreement (COA) and our position is as follows.

As we have stated before, we share your commitment to resolve the issues and the real problems facing the fish and wildlife resources within the Region. However, the COA is not, nor is any other single project or proposed action, the suitable vehicle to record and attempt to resolve all the fish and wildlife problems in the Central Valley. A response such as your final Coordination Act Report tends to cloud and confuse the issues if not outright mislead the reviewing public.

On September 25, 1985, you transmitted to me a draft memorandum and draft detailed report describing the effects of the COA with recommendations for mitigation. We provided comments on that report to you on October 10, 1985. On November 21, 1985, I received a revised memorandum and detailed report. In that memo you suggested I contact you by November 25, 1985, if I should continue to have problems with the contents of your report. Unfortunately, there was not enough time to provide you with a complete and thorough review of your revised report. Through our ensuing review we have determined that your revised final report has adopted numerous Bureau of Reclamation (BOR) comments, but your recommendations remain largely unaffected.

The Fish and Wildlife Service's (FWS) recognition of the impacts related only to the COA as opposed to those impacts of the existing and future segments of the Central Valley Project (CVP) is obvious by your method of presentation of impacts in separate categories. However, you still insist that all the impacts are COA related. For example, the inclusion of your new recommendation no. 10 and your distinction between COA-related impacts and "activities inseparably related to the COA" may only reflect a major policy dichotomy between BOR and FWS. I hope we can build a trust level that will allow us to resolve many of the issues that now confront us.

We have consistently indicated the COA should not be held accountable for impacts that may be related to future use of project water. Additional actions (including environmental review) must be completed before future water commitments can be made; these additional actions will address the respective project impacts.

The COA provides for protection of water quality in the Delta as set forth in Exhibit A which was extracted from D-1485. Implementation of the COA will allow the BOR and Department of Water Resources (DWR) to coordinate the operation of the CVP and the State Water Project (SWP) in a manner that allows more efficient use of water supplies and facilities of both projects. The CVP water supplies identified in the COA will be used to meet the multiple purposes of the CVP to the maximum extent practicable. The COA does not create water for the CVP or allocate CVP water to any particular use or uses.

Your report assembled the recommendations into two categories. One category pertained to COA impact mitigation while the other category pertained to "activities inseparably related to the COA (i.e., through the umbrella of the Secretary of Interior's Decision Document on Operation of the Central Valley Project, California, to Meet Water Quality Standards for the Sacramento-San Joaquin Delta, dated December 29, 1978)." Only two actions are recommended for mitigation of the COA - multiple-level outlet facilities at Clair Engle and Shasta Lakes and, pending construction of these facilities, maintenance of sufficient water storage at these two reservoirs to ensure temperature protection for salmon downstream from the dams. The remainder of the actions relate to the protection language in the referenced secretarial decision document.

Generally, your Report does not provide sufficient justification of recommendations, identification of authoritative sources of information (i.e., literature references, expert opinion sources), quantification of impacts, and explanation of cause and effect events. To meet the requirements of the Fish and Wildlife Coordination Act, the Report must be revised and include only those impacts attributable to the COA. The text must overcome these deficiencies. In its present form the Report is deficient in describing the consequences of the proposed actions. Details on significant fish species are lacking. Names of affected species, their respective life cycle requirements, and habitats should be discussed.

The following presents a detailed response to each recommendation.

Recommendation No. 1

Multiple-level intakes to the outlet structures at Clair Engle and Shasta Lakes be provided to allow the best possible control of water temperature for protection of downstream fisheries.

Response No. 1

Clair Engle Lake

COA impacts on Trinity River temperatures due to greater Clair Engle Lake drawdowns in dry and critical years are discussed in the COA Draft Environmental Impact Statement/Environmental Impact Report (DEIS/EIR) - page 78. Temperature warming was found to be significant (2°F or more) in only 3 years out of 82; minor (1°F) in 2 years; and non-existent in the remaining 77 years in the 1980 level studies. Minor impacts occurred in only one year in the 2020 level studies.

Multilevel outlets (MLO) for Trinity Dam (Clair Engle Lake) were evaluated in a 1979 BOR study for the Trinity River Basin Fish and Wildlife task force.* Preliminary cost estimates ranged from \$9 to \$30 million depending on the type of structure. The study determined that Trinity Dam MLOs would benefit fisheries in the spring and fall months by providing warmer temperatures downstream from Lewiston Dam. The ability of MLO to mitigate COA impacts by providing cooler temperatures in critical, low storage years was not evaluated, however.

Studies are currently underway by DWR, Department of Fish and Game (DFG), and BOR to evaluate means of controlling release temperatures to the Trinity Hatchery with structural modifications at the Clear Creek Tunnel intake (curtain) and the Lewiston Dam Hatchery supply intake (skimmer). Temperature control of releases to the Trinity River may be possible with similar modifications to Lewiston Dam at a much lower cost than Trinity Dam MLO.

Shasta Lake

COA impacts on Sacramento River temperatures due to greater Shasta Lake drawdowns in dry and critical years are discussed in the DEIS - pages 74-77. Significant warming was found to occur in only 3 out of 83 years, minor impacts in 2 years, with no impact in the remaining 77 years.

The feasibility of multilevel intakes at Shasta Dam for controlling Sacramento River temperatures is being evaluated in the Central Valley Fish and Wildlife Management Study - Problem C-2. The report is scheduled for completion during the summer or fall of 1986. Preliminary results of C-2 math model studies indicate overall reductions in temperature-related salmon mortalities ranging from about 2% to 6% depending on type of year. Cost estimates of Shasta MLO range from

*Rowell, J. H.; "Mathematical Model Investigations, Trinity Dam Multilevel Outlet Evaluation, Trinity River Temperature Prediction Study"; Trinity River Basin Fish & Wildlife Task Force - Interim Action Program; U.S. Bureau of Reclamation, Sacramento, CA; May 1979.

about \$10 to 30 million. The average annual cost per salmon saved was estimated to be about \$1300 for the most cost-effective MLO alternative evaluated.

Shasta MLO temperature benefits to salmon appear to be marginal in most years, and even less effective in critical years (i.e., 1933) when cold water availability in Shasta Lake is depleted during severe drawdown.

It would be fiscally and technically irresponsible for the BOR to recommend to Congress MLO facilities at Clair Engle and Shasta Lakes when costs are high and effectiveness marginal and even less effective in the driest years. However, we should wait for the study results before making any further recommendations.

Recommendation No. 2

"...storage be held at levels sufficient to assure that release water maintains the temperature in downstream reaches utilized by salmon for spawning and egg incubation at or below 56°F."

Response No. 2

COA temperature impacts related to Shasta and Clair Engle Lake storages occur in only dry and critical years (5 out of 82). Downstream temperatures without the COA during these years exceed 56°F, as well as with the COA. Therefore, this recommendation has no bearing on COA impact mitigation. With or without the COA, it would be physically impossible to meet this criteria in many years, particularly dry and critical years, given the demands on the CVP-SWP in the Delta and elsewhere.

Recommendation No. 3

Minimum flows from the Folsom Project to the lower American River be set at:

- a. No less than 1750 cubic feet per second from Nimbus Dam to the Howe Avenue Bridge from October 15 to December 31, for spawning salmon;
- b. No less than 1250 cubic feet per second from Nimbus Dam to the Howe Avenue Bridge from January 1 to March 31, for salmon incubation and rearing;
- c. No less than 1250 cubic feet per second from Nimbus Dam to the mouth of the American River from April 1 to June 30, and such additional flow as may be required to prevent water temperature at the mouth of the American River from exceeding 65°F, for salmon rearing and out-migration;

- d. No less than 800 cubic feet per second from Nimbus Dam to the mouth of the American River from July 1 to March 31, for all fishery purposes.

Response Nos. 3a, 3b, 3c, 3d

Recommendations 3a, 3b, 3c, and 3d were presented in an earlier report (FWS 1985) identifying the flow needs of chinook salmon in the American River. The FWS prepared this earlier report under contract with the BOR as a part of the BOR's Auburn-Folsom South Unit studies which are associated with the development of Auburn Dam. The flow recommendations were derived from an Instream Flow Incremental Methodology study for use by the BOR in the reauthorization of the Auburn-Folsom South Unit. The BOR participated in the instream flow studies in 1981 and reviewed the analysis and subsequent report.

The BOR is presently obligated to provide flows in the American River as defined in State Water Resources Control Board Decision D-893 relative to the Folsom Project. This decision resulted from an agreement between the BOR and DFG in 1957 on the fishery and other needs in the American River.

The BOR recognizes that the flows in D-893 are less than desired, but we disagree that the Folsom Project authorization should be revised to accommodate higher flows. The BOR supports development of an increased flow regime which will be developed in the Auburn-Folsom South Unit study; this increased flow regime would be provided by Auburn Dam and Reservoir.

Relative to your recommendation 3c in particular, the COA temperature impacts are minor and occur in only 2 out of 82 years. This recommendation, therefore, has little or no relationship to mitigation of COA impacts. Lower American River temperatures are dependent on Nimbus release temperatures and climatic conditions as well as flow. With typical Nimbus temperatures, flows required to maintain 65°F at the mouth during April-June have been estimated to range from less than 500 to about 9,000 cfs depending on air temperature conditions. This wide range of required flows, along with the other factors influencing river temperatures, would make it difficult, if not impossible, to implement this recommendation.

We feel the reauthorization of the Auburn Dam-Folsom South facilities is the proper vehicle for developing revised flows for the American River.

As you may know, there currently is litigation related to the flow requirements of the lower American River and there are efforts under the auspices of Sacramento County to establish an adequate flow regime. Both of these activities could be important factors in developing an acceptable solution to what has been a long standing issue. These issues are important to the BOR but are totally unrelated to the COA.

Recommendation No. 4

At least 60,000 acre-feet of water be reserved in Folsom Reservoir for release at the direction of the fishery resource agencies during the period October 15 to June 30 to facilitate upstream and downstream migration of salmon.

Response No. 4

Same as response to Recommendation Nos. 3a-3d.

Recommendation No. 5

The minimum flow from the Shasta/Trinity project to the Sacramento River be set at 6,000 cubic feet per second pending the results of a 2-year study currently being undertaken by the DFG on the relationship of river flows to fish habitat in the river.

Response No. 5

There is an agreement between the BOR and DFG, signed in 1960, which defines minimum flows to be maintained by CVP facilities in the upper Sacramento River. The BOR, under the Central Valley Fish and Wildlife Management Study, is presently evaluating several alternative flow regimes expressly for salmon in the Sacramento River. Personnel from the BOR, DFG, and FWS are participants on the planning team that is evaluating these flow alternatives. Computerized mathematical model studies will be performed to evaluate the impact on CVP operations. Water temperature conditions on the river that will occur as a result of these flow regimes will be evaluated to identify the impacts on salmon. Reservoir fisheries impacts will be evaluated to determine the impacts resulting from these flow regimes.

We understand DFG is currently heading an instream flow incremental methodology study to identify the salmon flow requirements in the Sacramento River. DFG's effort will collect and analyze hydrological and biological field data for use in developing fish flow criteria and is unrelated to the COA.

Pending the conclusion of the BOR and DFG studies, we feel the establishment of interim flow criteria is premature. We support the need to develop criteria based on sound data developed through a well-designed program. We are unaware that such data exist. We therefore cannot support any changes at present to the flows contained in the 1960 agreement.

Recommendation Nos. 6, 7, and 8

6. A firm annual surface supply of 211,000 acre-feet of Class 1 water be delivered to Central Valley national wildlife refuges on a nonreimbursable basis.
7. A firm annual supply of 246,000 acre-feet of Class 1 water be furnished, on a nonreimbursable basis, to the Grasslands Resource Conservation District and Butte Sink Area to serve migratory bird needs.
8. A firm annual supply of 78,000 acre-feet of Class 1 water be furnished, on a nonreimbursable basis, to the State of California's Los Banos, Mendota, and Gray Lodge Wildlife Management Areas.

Response Nos. 6, 7, and 8

Providing additional water to wildlife refuges will not mitigate any negative impacts of the COA. Therefore, these recommendations should be deleted. As we previously stated, the COA would not by itself result in any new water contracts. Furthermore, any new contracts would not necessarily result in impacts to fish and wildlife by converting native vegetation to irrigated farmland. Most new contracts would, more than likely, go to already-developed lands with a groundwater overdraft problem. Also, the environmental impacts of such contracts will be addressed in other NEPA analyses.

Your recommendation that BOR commit 535,000 acre-feet on a nonreimbursable basis of firm CVP surface water supplies for uses in public and private wildlife management areas located in the Central Valley of California would require additional authorization beyond the approximately 100,000 acre-feet now authorized to be furnished on a nonreimbursable basis to these lands. If these additional water supplies were to be furnished on a nonreimbursable basis, then the cost to the Federal Treasury, in terms of scheduled revenues foregone, could be as much as \$810,000,000 during the remaining 45 years of the authorized repayment period associated with the existing CVP.

The BOR is aware of the need for additional water supplies for Federal and State wildlife refuges in the Central Valley. Problem B-1 of the Central Valley Fish and Wildlife Management Study is investigating this problem. The interagency team, of which the FWS is a part, is currently completing an appraisal-level study identifying problems and needs of the refuges. In addition, a two-year feasibility-level refuge water supply study began in October 1985. This study will identify sources of water and methods to deliver a firm supply of water of acceptable quality to each of the refuges, and to the Grasslands area.

Recommendation No. 9

A firm supply of power be provided, on a nonreimbursable basis, to Central Valley national wildlife refuges, State waterfowl management areas, and to Coleman National Fish Hatchery.

Response No. 9

Providing power is not relevant to any COA impacts, in a manner similar to the earlier discussion for water deliveries to wildlife areas.

Whether or not we can provide project power to Coleman is a question we are trying to answer through other means. The COA is totally unrelated.

Recommendation No. 10

No further contracting of CVP firm supply for agricultural, municipal, or industrial uses be undertaken until all fish and wildlife needs associated with the CVP have been identified, resolved, and solutions authorized.

Response No. 10

The fish and wildlife issues you have raised are not a result of the COA. In fact, many of them may not even be a result of past activities related to the CVP. To recommend prohibition of further contracting pending resolution of such unrelated issues is inappropriate for the purposes of your Report and misleading to many of those who might review it.

The following are specific comments on the text of the detailed Report.

Specific Comments - Memorandum

1. Page 1, last paragraph: Your Coordination Act Report itself will be part of the total reporting package to accompany the DEIS/EIR.
2. Page 2, first full paragraph: Your Report may be brief and unsupported by field studies, but you have had several years to consider the potential impacts of the COA. The COA itself has changed little since the December 4 draft of 1982. The BOR and FWS negotiated in the fall of 1983 for appropriate evaluations related to the COA, and Letter of Agreement No. 12, signed by James W. Teeter, on December 8, 1983, was the result. Likewise, many of your recommendations are in the DEIS/EIR. They were received on January 4, 1984, and are located under Appendix C, Consultation and Coordination.

Specific Comments - Detailed Assessment

1. Page 1, paragraph 2, sentences 5 and 6: Your Report should be reviewed for possible revision, since a later draft EIS/EIR (July 1985) is available than the draft identified in this report.

2. Page 3: We recommend that the Report delete all lines beginning with "Article 1, Preamble" and ending with "Exhibit E, Water Shortage and Apportionment." The deleted text appears to be unnecessary because it does nothing to aid the reader in understanding the COA operation.

3. Page 4, second full paragraph: Interim water is, in essence, discussed here. Intermittent is academic since the CVP would be operated to meet D-1485 in all but dry years.

The no-action operation studies used are appropriate. Due to power operation and flood control operations, D-1485 is normally or even incidentally met in all but dry and critical years.

4. Page 5, first full paragraph, sentence 2: There are numerous references in the report to the Secretary of Interior's Decision Document on Operation of Central Valley Project, California to Meet State Water Quality Standards, dated December 29, 1978. We recommend the document be properly cited as such and that a brief explanation of at least Option 6 be included.

5. Page 8, paragraph 3, sentence 3: This sentence is misleading and confusing. The information presented will only be understood by scientists or people with previous exposure to striped bass problems in the Delta. The significance of the index must be defined, as a minimum.

6. Page 8, paragraph 7; and page 9, paragraph 1, sentences 1 and 3: The quantitative and qualitative information that exists on waterfowl should be presented (summarized, if appropriate) and/or referenced properly.

7. Page 9, paragraph 5: BOR maintains estimates on angler use in CVP reservoirs. This information is available and should be included in this paragraph.

8. Page 12, paragraph 1, sentence 9: The statement "loss of salmon in other types of water year has not been estimated." This statement implies there may be temperature-related salmon losses in years other than critical and dry years. The studies found no impacts in other years (77 out of 83). Of the six critical and dry years, only three were found to have significant temperature impacts (greater than 1°F).

9. Page 12, paragraph 3, sentence 2: The implication that there could be significant temperature impacts in "16 out of every 600 months" on

American River fisheries does not agree with the temperature study results. Minor temperature impacts of about .5-1°F were found in only 8 months out of 83 years (996 months) at the 1980 level. No impacts were found at the 2020 level.

10. Page 18, item 2, sentence 3: The Report does not identify which life stages of salmon are affected by temperatures in the 56-62°F range. In addition, the type of exposure that results in mortality (duration of continuous exposure, frequency of exposure, etc.) should be discussed. Further, the Report should identify whether the vulnerable life cycle stages are present when expected high water temperatures would occur.

Conclusion

The BOR, with assistance from the FWS, DFG, and many other agencies, organizations, and individuals, has been working to resolve many of the fish and wildlife resource problems described in the Report for many years, and will continue to work towards their resolution. However, the BOR will not support unfounded conclusions leading to unsuitable recommendations. The problems facing the fish and wildlife resources are many and varied, and the solutions, it would seem, are even more complex. My personal perspective is that we should try to build consensus on as many issues as we can afford, with as many beneficiaries as can reasonably be expected, and which corrects as many of the fish and wildlife problems as we can foreseeably correct, but which avoids unreasonable sacrifices.

In the future, building consensus will be the key ingredient to protecting the fish and wildlife resources rather than confrontation. We look forward to working with you in pursuit of that objective.

(sgd) LAWRENCE E. HANCOCK

BSchroeder:cd 1/10/86

Retyped: 1/29/86

Section 3. COMMENT LETTERS AND TRANSCRIPTS OF PUBLIC MEETINGS



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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
215 Fremont Street
San Francisco, Ca. 94106

NOV 14 1985
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BLK

November 13, 1985

Bob Schroeder
U. S. Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, CA 95825

Dear Mr. Schroeder:

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement/Report (DEIS/R) titled COORDINATED OPERATION AGREEMENT, CENTRAL VALLEY PROJECT/STATE WATER PROJECT.

The Environmental Protection Agency strongly supports the development of a Coordinated Operation Agreement between the Central Valley Project and the State Water Project. This will enable the two projects to operate more efficiently, while assuring that each project share in the responsibility to protect the beneficial uses of the Bay/Delta estuary.

We have classified this DEIS/R as Category EC-2, Environmental Concerns - Insufficient Information (see attached "Summary of Rating Definitions and Follow-Up Action"). This DEIS/R is rated EC-2 because of: 1) the lack of commitment to fully meet current water quality standards (Suisun Marsh standards), and 2) the need to outline a procedure by which future water quality standards will be reviewed for consistency with Congressional directives. More detailed comments regarding our concerns are enclosed. The classification and date of EPA's comments will be published in the Federal Register in accordance with our public disclosure responsibilities under Section 309 of the Clean Air Act.

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We appreciate the opportunity to review this DEIS/R. Please send 3 copies of the Final Environmental Impact Statement/Report (FEIS/R) to this office at the same time it is officially filed with our Washington, D.C. office. If you have any questions, please contact Mr. Brian McKeown, Water Management Division, at (415) 974-8286 or FTS 454-8286, or Ms. Roberta Blank, Federal Activities Branch, at (415) 974-8187 or FTS 454-8187.

Sincerely yours,

Charles W. Murray, Jr.
Assistant Regional Administrator
for Policy and Management

Enclosure (3 pages)

cc: Karl Winkler, California Department
of Water Resources

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Water Quality Comments

1. Regarding compliance with the Suisun Marsh standards, page 24 of the DEIS/R states:

The post-1984 standards for Suisun Marsh were not included in Exhibit A because it was agreed by the Department and the Bureau that the Agreement would contemplate existing facilities only. Also, negotiations concerning protection of Suisun Marsh were proceeding separately, so the Marsh was considered a separate issue.

We find the rationale that compliance with the standards is tied to the construction of engineered facilities to be unupportable. During the Second Triennial Review of the Delta Plan, the State Board made it clear that compliance with Suisun Marsh standards was mandated as of October 1, 1984, "through whatever means are available to the projects." Specifically, Page V-12 of the Appendix to the Delta Plan states:

Consequently, modifications have been made reluctantly in the plan extending the compliance date for full project mitigation of the Marsh to October 1, 1984 and increasing interim Marsh protection in dry and critical years. The project operators should not view this date as a target to shoot for, but as a date by which full mitigation will be required through whatever means are available to the projects.

Therefore, the Suisun Marsh standards should be included in Exhibit A.

2. Article 11 of the Coordinated Operation Agreement commits the USBR to comply with future water quality standards if they are not inconsistent with Congressional directives. However, the DEIS/R does not spell out the Congressional directives which must be complied with and how the determination of consistency will be made. The FEIS/R should outline the procedure the USBR will utilize to determine if these new standards are consistent with Congressional directives.

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3. It has always been EPA's position that the U. S. Bureau of Reclamation (USBR) is required to meet Delta water quality standards under the authority of Section 313 of the Clean Water Act. The Delta Water Quality Control Plan (D-1485) established State water quality standards which are Federally approved, to control and abate water pollution (salt water intrusion). The FEIS/R should address the USBR requirement to meet current and future Delta water quality standards under authority of Section 313 of the Clean Water Act.

4. Page 1 of the DEIS/R states:

Federal legislation authorizing the Central Valley Project in 1937 declared that its facilities "shall be used first for river regulation, navigation and flood control; second for irrigation and domestic uses; and third for power." Salinity control in the Delta was not specifically listed as a project purpose.

However, in the recent California Superior Court Decision on D-1485, Judge Figone wrote, "this court concludes that the term river regulation was intended to include salinity and that salinity control has a higher priority for use than does the export of water for irrigation." Therefore, the FEIS/R should specifically address the ramifications of the authorization of the Central Valley Project for regulation river of flows and the impact on salt water intrusion.

5. Page 97 of the DEIS/R states:

After the Coordinated Operation Agreement is signed, the Bureau of Reclamation plans to propose that the Secretary of the Interior lift a moratorium on the Bureau entering into additional long-term CVP water service contracts. The moratorium was administratively imposed by a previous Secretary of the Interior in 1979. The terms of the moratorium provided that it would be lifted when the responsibilities of the CVP toward water quality protection in the Delta had been clarified and the Bureau had committed itself to meet these responsibilities. Signing the Agreement would commit the Bureau to meeting these responsibilities.

The terms of the moratorium required that the responsibilities of the CVP would first be clarified. It is EPA's position that this has not been fully accomplished. Currently, there is no commitment to meeting the water quality standards established for the protection of Suisun Marsh. In addition,

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there is no protection allocated to the beneficial uses of San Francisco Bay. The Delta Water Quality Control Plan hearings will open in 1986, and could result in substantial revisions to provide protection for San Francisco Bay. At this time, the CVP has not clarified how it will determine if future water quality standards are or are not consistent with Congressional directives. The Agreement does not outline how these future responsibilities will be met. If additional water contracts are signed, it should be specified that these additional commitments do not take precedence over flows that will be required for protection of the Bay/Delta estuary. EPA strongly believes that these issues need to be fully resolved prior to any commitment for long-term water service contracts.

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SUMMARY OF MAJOR DEFICIENCIES AND FOLLOW-UP ACTION*

Environmental Impact of the Action

10—Lack of Objectives

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

11—Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

12—Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

13—Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the OIG.

Adequacy of the Impact Statement

Category 1—Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2—Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analysis, or discussion should be included in the final EIS.

Category 3—Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analysis, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 109 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the OIG.

*From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
CALIFORNIA STATE OFFICE
2800 Cottage Way
Sacramento, California 95833

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CA-930.15

OCT 10 1986

Memorandum

To: Director, Office of Environmental Affairs (150)
From: Deputy State Director, Lands & Renewable Resources

Subject: Review of the Draft EIS and Report on the Coordinated Operation Agreement for the Central Valley Project/State Water Project in California

The subject operation agreement does not impact BLM land or programs.

Accordingly, we have no comments on the related EIS.

William A. Kennedy

CC: Utah and Bakersfield
MD (202), Room 909-15 Premier

MICROFILMED

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

JAN 6 1986

Memorandum

To: Regional Director, Mid-Pacific Region, U.S. Bureau of Reclamation, Sacramento, California
Attn: Bob Schreuder
From: Regional Director, Region 1, USFWS, Portland, Oregon
Subject: USBR: CVP/SWP Coordinated Operation Agreement - Draft Environmental Statement/Report (EC 85/67)

The Fish and Wildlife Service has reviewed the draft environmental statement/report on the Coordinated Operation Agreement and offers the following comments.

General Comments:

The Fish and Wildlife Service believes that the draft environmental statement/report (DEIS/EIR) is inadequate respecting the analysis of impacts to fish resources of the Sacramento and Trinity Rivers and San Francisco Bay. Also, an incorrect assumption in developing the No Action alternative causes problems in analysis that cannot be overcome without major reanalysis. The methods and approaches used to analyze the impacts on fish and wildlife results in a conservative estimate of physical and biological changes due to the Proposed Action. The use of average monthly data in operation studies of flow and water temperatures cannot always satisfactorily describe the physical conditions that determine fish numbers. In such cases the analysis and findings should be viewed with skepticism and the benefit of the doubt given to the fish resources. In the DEIS/EIR, impacts to fish and wildlife resources were consistently rejected or discounted whenever any doubt existed.

The Proposed Action, which has actually been in effect since 1979, improves water quality in the Delta but at the expense of upriver fishery habitat. The release of warm water to salmon producing streams which at times are already too warm has had a measurable negative effect. The Fish and Wildlife Service position is that all adverse impacts should be fully compensated. Yet the DEIS/EIR states that compensation is not needed for the Coordinated Operation Agreement.

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The Coordinated Operation Agreement requires that the Central Valley Project be operated to meet Delta water quality standards (D-1485). In the DEIS/EIR these standards are characterized by such misleading statements as "provides overall resource level protection" and "protects migrating salmon with year-round minimum flow requirement". It is known that there are deficiencies in D-1485 standards that preclude protection of Delta fish habitat at the desired level. Since 1978 striped bass levels have been very poor even though water conditions for recruitment have generally been fair to good. In fact, the impacts of the Proposed Action on striped bass are not even quantitatively described in the DEIS/EIR. D-1485 standards provide inadequate spring outflow conditions for juvenile salmon, and there are no standards for the protection of San Francisco Bay.

Specific Comments

Page 5-1, Para. 4 - We suggest that the word "similar" be deleted as it implies that the "No Action" and the "Proposed Action" conditions are identical.

Page 5-2, No. 2 - The CVP's annual water supply is stated inconsistently throughout the document. On page 5-2 the supply at the 2020 level of development is given as 8.4 million acre-feet. On page 17, under the section titled "Annual Water Supplies", a figure is not stated but a reference to Exhibit B-2 is made. Exhibit B-2 shows a full development supply of 8.254 million acre-feet. Information on page 68, para. 3, indicates that the ultimate supply will be 8.2 million acre-feet. On page 98, a yield of 8.3 million acre-feet is indicated. Inasmuch as fish and wildlife are a potential user of remaining uncommitted supply, it is imperative that the amount be clearly identified.

Page 5-3, para. 3 - It is misleading to say that "The Agreement fairly protects the interests of both projects while meeting responsibilities to protect the water related environment." The statement should be reworded to read "The Agreement protects the interests of both projects while improving the level of protection afforded the water related environment of the Sacramento-San Joaquin Delta."

Page 5-3, Alternative 2 - Starting here, and throughout the report, the No Action alternative is described as the CVP meeting Delta Standards in all but critically dry years. While this would benefit the Delta environment, and we hope that it is achieved, the Secretary of the Interior is authorized only to meet Tracy Standards. The changeover in 1979 to meet D-1485 standards was a significant action that should have been evaluated at that time together with authorization for the needed fishery compensation. Recognizing the need to act quickly, however, the decision was made to meet the standards until studies could be conducted and a written agreement for coordinated operation prepared. Fish and wildlife resources were significantly affected by this change in operation. The only operations studies available for our evaluations are deficient

as they omit the major impacts of the Proposed Action. Our concern about this key assumption was brought up as early as October 14, 1983 in a planning coordination meeting with both Bureau of Reclamation and Department of Water Resources staff.

Page 5-4, last para. - It is misleading to state that, "To meet the protective criteria of Exhibit A could require project operational changes. Any change could have an effect, however, in all cases the overall environmental protection to the resources with the standards exceeds those of any of the proposed alternative actions." We suggest that this be reworded to read: "To meet the criteria of Exhibit A would require project operational changes. Any change would have an effect."

Page 5-5, para. 1 - Peak Delta outflows "would be", rather than "could be", reduced. Only when viewed from the perspective of average monthly outflow might it be stated that outflows would be "slightly lessened". We suggest that the word "peak" be deleted and "average monthly" substituted.

The final sentence of the paragraph should be ended at "...with No Action." We do not believe that the statement as written is supportable. The hydrologic and hydraulic changes that would occur in the Bay as a result of reduced Delta outflow are significant. The impacts that would occur to Bay fish and wildlife resources might be highly significant.

Page 5-6, Rivers and Reservoirs, para. 1 - Operations in critically dry years which provide yield would require operations in the year or years immediately following to replace the storage. When most reservoir inflow is being held for storage the rivers below such reservoirs typically have very low flows. The statement "Critical years occur less than 10 percent of the time, and operations during other year types would not significantly affect storage changes" is incorrect and should be changed to reflect the above.

Page 5-6, last para. - The paragraph reads: "It should be recognized, however, that salmon impacts discussed above are local effects and may not occur under operating assumptions different from those used in the alternatives, yet are still possible in the future. Inherent in this Agreement is the commitment by both the CVP and SWP to meet an adopted set of standards designed to protect salmon (and other resources) and that meeting these standards is judged more beneficial to salmon overall than if these standards are not met." This paragraph is misleading and unsupported. D-1485 standards are slightly better for salmon in the Delta but they necessitate greater operational changes that may well have an adverse impact of greater magnitude than the beneficial impact in the Delta. We suggest that the paragraph be deleted.

Page 5-7, Mitigation Measures - There is no way that an improvement in the Delta can mitigate upstream water temperature impacts on salmon.

The last sentence of the first paragraph, which reads "These standards are designed to mitigate for impacts to the salmon (and other) resources, and meeting these standards is judged more beneficial to this resource than not meeting these standards", is untrue for the Central Valley as a whole. The statement is unsupported and should be deleted.

The statements in the second paragraph that "The concern (for water temperature) exists with or without the Proposed Action, and the Proposed Action would not necessarily make it any worse. Further studies and actions will provide added mitigation." should be deleted unless the actions are identified.

Page 5-9, Table 1 - We suggest that the word "reasonable" be deleted from the title of the table. It implies that other alternatives are unreasonable and that the No Coordination alternative is reasonable even though the text states that the No Action alternative is "not preferred because it would have serious adverse effects on both projects and the environment."

Page 22, top line of both columns - The policy referred to is an interim policy -- interim from what is authorized (i.e., Tracy Standards) and what is planned to be authorized. This should be clearly stated.

Page 26, para. 3 - The objective of the Fish and Wildlife Service's proposal was to make the best of a bad situation. The final sentence of the paragraph should simply state that "The Fish and Wildlife Service proposal was not accepted." On January 7, 1983 we were informed by a key negotiator for the Bureau of Reclamation that the negotiators thought it inappropriate to include the Service's proposal.

Page 28, para. 2 - We disagree with the statements: "In the table, the Proposed Action sets the conditions to which the alternatives are compared. This is because the Proposed Action meet nearly approximate continuation of the status quo."

Page 37, Mitigation Measures - The statements that "The Agreement provides overall resource level protection," and that "The Exhibit A standards of the Proposed Action are mitigation themselves for the projects," cannot be supported and are misleading. We suggest that they be deleted.

Page 39, first paragraph - San Francisco Bay must be included as one of the affected environments.

Page 39, Regional Setting - It should be noted that part of the Trinity River Basin is considered as part of the regional setting.

Page 51, next to last paragraph - This paragraph should be corrected to read "Decision 1485 provides a slightly better level of protection for salmon in the Delta than occurred when the CVP was operated under Tracy Standards." As written, the sentence implies that there were no year-round minimum flow provisions for the Sacramento River at Rio Vista.

Page 57-59 - The Proposed Action and No Action alternatives are described relative to a non-existent baseline. In our view the No Action alternative should be the baseline.

Page 64, Affected Environment, Central Valley Project Service Area - The CVP commitment stated as 7.32 million acre-feet does not agree with Table 9, page 66, which shows a commitment of 7,132,922 acre-feet. This discrepancy should be explained.

Page 73, Environmental Consequences, Rivers and Reservoirs, first para. - The second sentence should be changed to read: "The differences would arise in critical years and the year(s) immediately following critical years."

Page 82 - It would be of informational value to identify the power needs of Service hatcheries and refuges in this section. Appropriate wording can be extracted from our Fish and Wildlife Coordination Act Report on the COA.

Page 93, Adverse Environmental Effects That Cannot Be Avoided - It should be recognized as an unavoidable effect that significant adverse impacts to water temperatures in the upper Sacramento and Trinity Rivers would occur with the Proposed Action. Likewise, a reduction in the magnitude and frequency of peak Delta outflow to San Francisco Bay is unavoidable; the consequences of this change to fish and wildlife have not been determined.

Page 93, Irreversible and Irrecoverable Commitments of Resources - It should be stated that the Proposed Action may involve irreversible or irretrievable commitment of resources if the winter-run race of chinook salmon is extirpated. Even if not extirpated, the losses in winter-run salmon that occur in a given year may not be replaced in subsequent years.

Page 96 and 97, Wheeling Arrangements and Purchase of CVP Water by the SWP - Under these two sections it should be stated that the incremental impacts of such actions would (1) increase the loss of fish and fish food organisms at export facilities, (2) increase channel velocities, already too high, in certain Delta channels, (3) exacerbate the problem of reverse flow in certain Delta channels, (4) further reduce Delta outflow to San Francisco Bay, (5) increase channel scour and silt deposition, and (6) worsen water-level draw-down in the Delta near export facilities.

Page 97, Removal of the Moratorium on New Water Service Contracts, para. 1 - The Secretary's moratorium encompasses more than is acknowledged in the DEIS/EIR. An important provision of the moratorium is that "No long-term commitments will be made by the Secretary for sale or interim or intermittent water until the issue of instream flow needs in the areas of origin or affected waters has been resolved and until the water needs for migratory birds on Central Valley National Wildlife Refuges have been met." This should be clearly stated in this section as well as in relevant sections of the summary. Refuge needs amount to 535,000 acre-feet annually and these and instream flow needs are more fully described in our Fish and Wildlife Coordination Act Report on the COA.

6

Robert C. Fletcher
215-31
John M. Doolittle
D. Kennedy
K. Winkler

Mr. Dave Houston
Regional Director
U. S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95814

Dear Dave:

Several months ago we discussed the Coordinated Operations Agreement. As I indicated, Fish and Game supports the agreement but believes it's essential that we deal with several fish and wildlife issues during the water marketing process.

Since the Bureau and the Department of Water Resources have started negotiations on marketing water and have initiated the environmental impact process, we should start dealing with the fish and wildlife issues now. Hopefully that will produce an accord by the time that you are ready to market the water. I suggest that each of us appoint a staff person to begin negotiations. The negotiators' first task should be to formulate the issues to be considered and prepare a time schedule for negotiations. January 1, 1986 would seem to be a reasonable deadline for completing that step. We should invite the Fish and Wildlife Service and the Department of Water Resources to participate.

I look forward to an early response to this proposal.

Sincerely,
Original signed by
COPY Robert C. Fletcher
RCL

Jack C. Farnell
Director

cc: D. Kennedy
R. Myshak

361 27 000
This approach should be worked in regarding to many of the Central Valley
JME

State of California
Memorandum

BA

The Resources Agency
cc: SCH
Ann Reggy

To : 1. Projects Coordinator
Resources Agency

Date : November 6, 1985

2. Department of Water Resources
3251 S Street, Room D-4
Sacramento, CA 95814

From : Department of Fish and Game

Subject: Draft Environmental Impact Statement/Report Coordinated Operation Agreement, Central Valley Project/State Water Project, SCH 85092303

Staff of the Department of Fish and Game have reviewed the EIS/EIR. Comments have been prepared and are waiting for review and signature by our Director. This will occur by November 13, 1985 and is in compliance with the review period established by the Department of Water Resources in their cover letter of September 18, 1985.

COPY Original signed by
Robert C. Fletcher

Robert C. Fletcher
Deputy Director

RECEIVED
NOV 08 1985
State Clearinghouse

8E

JME

November 13, 1985

Mr. Dave Kennedy
Department of Water Resources
1416 Ninth Street
Sacramento, CA 95814

Mr. Dave Houston:
U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

Gentlemen:

Thank you for the opportunity to comment on the Draft Environmental Impact Statement/Report on the Coordinated Operation Agreement (COA) for the Central Valley Project (CVP) and State Water Project.

As a trustee agency over natural resources in the State of California, the Department of Fish Game (DFG) must comply with both the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) and our review of this document must satisfy both statutes.

We have reviewed the Draft EIS/EIR and have discussed it with staff of both lead agencies. We find it incomplete in its treatment of impacts to fish and wildlife resources associated with the COA itself, and we have concerns with the way it addresses the CVP as it exists today, and potential marketing of additional water.

Regarding potential impacts of the Agreement itself, the report begins to address the problems, but is incomplete. The report indicates that water used to help fish in the Delta will be at the expense of fish upstream. In a worst-case analysis, 50 percent of chinook salmon will be lost in their spawning beds while downstream migrants in the Delta are protected. This no-win situation is not acceptable from a resource standpoint. In addition, the Bureau's operational studies (using monthly temperatures, etc.) described in the report are insufficient to identify all impacts. The sole mitigation proposed for the Agreement (page 37) is the Exhibit A standards of the preferred alternative. Nowhere in this exhibit is mitigation proposed for upstream impacts in the varying scenarios. Specific mitigation measures for these impacts should be contained in the document and would include, but not be limited to:

- 1. Guaranteed constant low-flow regimes (i.e. minimize flow fluctuations) below Keswick Dam between October 1 and March 1 of each year to minimize loss of salmon eggs and fry due to dewatering of redds.

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AC R. Yaman
11-13-85
H. E. T.

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- 2. Guaranteed releases from Trinity Lake via Whiskeytown Lake into the Sacramento River during the fall when temperature problems in the Sacramento River below Keswick are most prevalent.
- 3. Guaranteed releases from Shasta Dam to act as dilution flows when water behind Spring Creek Diversion Dam is released or spilled during fall and winter storms. Such dilution flows are critical to avoid concentrations of heavy metals in the Sacramento River below Keswick Dam that are lethal to salmon eggs and fry.
- 4. Guaranteed releases into the Trinity River below Leviston Dam to improve the anadromous fishery as proposed by the Trinity River Basin Task Force.
- 5. No new water supply contracts consummated until our Sacramento River instream flow study is completed and an adequate flow schedule guaranteed by the Bureau.
- 6. Guaranteed higher minimum pool in Shasta Lake to help minimize temperature problems in the fall in the Sacramento River below Keswick Dam.

Modifying CVP operation and setting aside a portion of CVP yield may be necessary to implement the above.

In addition to these mitigation measures, the document should include detailed analyses of how delivery schedules resulting from the COA may increase the demand by landowners for additional bank protection projects along the Sacramento River between Redding and Chico Landing.

The conclusion that about one million acre-feet per year of "uncommitted" water supply will exist at "full development" appears to be based on the assumption that instream flows in the Trinity and American rivers will be reduced at that time. The flows assumed for the "full development" studies have been demonstrated to be inadequate to maintain fish, wildlife, and recreational resources of those rivers.

The document also should address potential impacts of the Agreement on the San Joaquin River System and propose mitigation measures. These should include measures to protect the fall migration of adult salmon from the Delta into the San Joaquin tributaries to spawn and the spring and fall chinook out-migrants.

The document points out (page 8-7) "the proposed agreement could be considered a link in a chain of events that could lead to other actions that could have significant environmental impacts." We agree. The chain of events began with the authorization and

3

Appendix C, Page 3-9 - These 5 "specific recommendations by the Fish and Wildlife Service" were not submitted by us as recommendations. These are simply a few of the many ideas/needs that were discussed in the Fish and Wildlife Service input of December 1983 to the DEIS/EIR. Preparers of the DEIS/EIR other than the Fish and Wildlife Service listed these few ideas and developed the responses. Presenting an incomplete list of environmental concerns seriously misleads the reader as to the position and recommendations of the Fish and Wildlife Service. We suggest that the lead-in sentence be reworded to read "Some of the concerns of the Fish and Wildlife Service are as follows:" Similarly retitle the headings as "Concern No. 1", "Concern No. 2", etc.

On page 6, 7, and 8 the response to our Concern No. 4, though lengthy, is incorrect and inadequate. We believe that the Proposed Action "would" rather than "may" significantly impact fish resources. Further, we believe that the impacts would occur in critical dry years and in the year(s) following. The discussion on the frequency of significant impacts is incorrect because, in our opinion, the incorrect No Action alternative was used for analysis. The argument on pages 7 and 8 that fish will find isolated thermal refuges is unsupported. Overall, the 64-line response to Concern No. 4 is in need of major re-writing.

Summary Comments

It is unfortunate that after our agencies have worked so closely that there are still such differences in the analysis of impacts on fish and wildlife resources. Our major problem with the DEIS/EIR stems from what we believe to be incorrect assumptions leading to incorrect operation studies. We believe that to be adequate the environmental analysis must be based on the proper No Action alternative information. We will assist in whatever way is needed to make these corrections should you so request.

- cc: ARD (HR), FWS, Portland, OR.
- ARD (MR), FWS, Portland, OR.
- ARD (FR), FWS, Portland, OR.
- FWS/EC, Washington, D.C.
- FWS/ES, (Fwd Proj), Washington, D.C.
- Karl Winkler, CA Dept. Water Resources
- Sacramento, CA.

[Handwritten signature]

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United States Department of the Interior

NATIONAL PARK SERVICE
WESTERN REGION
430 GOLDEN GATE AVENUE, BOX 38003
SAN FRANCISCO, CALIFORNIA 94132

NO SUPPLY AFTER 10:15
17619 (WB-87)

October 28, 1985

Memorandum

To: Regional Director, Bureau of Reclamation, Sacramento
From: *[Handwritten initials]* Regional Director, Western Region

Subject: Draft Environmental Statement--Report, Coordinated Operation Agreement, Central Valley Project/State Water Project, California, DEB-85/42

[Handwritten routing slip with dates and initials]

In accordance with the September 13, 1985 memorandum from your Director, Office of Environmental Affairs, we have reviewed the subject document and have the following comments.

The Trinity River, below Lewiston Dam, and the American River, below Nimbus Dam, are components of the National and State of California Wild and Scenic Rivers System. Both river areas are affected by the proposed Coordinated Agreement and any change in flow regime for these rivers could have an impact on the values protected by the National and State System designation--namely anadromous fishery and recreation. Therefore, the affected Environment section of the EIS/EIR should specifically identify the Federal/State Wild and Scenic Rivers System involvement and the Environmental Consequences section should indicate whether or not the proposal and alternatives would be consistent with the State/Federal Acts.

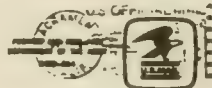
[Handwritten signature]

cc: MABO (762)

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1985 OCT 31 10:11 AM

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DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT OFFICE
430 COLLEGE WAY
SACRAMENTO, CALIFORNIA 95816
OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300
5152FD-3



Mr. Bob Schroeder
Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, CA 95825

DATE: 11, 1985

TO: BOB SCHROEDER (916) 551-1878

FROM: WALTER YEP (916) 551-1878

RE: Letter dated September 18, 1985, requesting comments on the Draft EIS for the proposed coordinated operation of the Federal Central Valley and the California State Water Projects.

ACTION TAKEN OR TO BE TAKEN

REPLY WILL BE PROVIDED ON OR ABOUT _____ REPLY REQUIRED

REPLY DATE NOT KNOWN FOR REPLY

NO REPLY REQUIRED

NO REPLY REQUIRED

REASON FOR NO REPLY: NO COMMENT COMMENT

NAME: WALTER YEP
TITLE: Chief, Planning Division
[Handwritten signature]

Construction of the CVP, continues today, and has no clearly defined endpoint. Unless a conclusive timetable and method for how overall CVP impacts and marketing of water impacts will be addressed is provided, we believe that Section 15165 of CROA, "Where an individual project is a necessary precedent for action on a larger project or commits the Lead Agency to a larger project, with significant environmental effect, an EIR must address itself to the scope of the larger project" should be followed.

Our Department believes there is a need to address the cumulative impacts in addition to the ones directly caused by the COA. NEPA (Section 1508.25) requires this as well. The COA should be put into the perspective of the larger scope of the CVP or explanation provided as to why not and how and where the lead agencies will address these broader issues.

Therefore, if the DEIR/EIS is to reflect potential cumulative impacts beyond the impacts solely caused by the COA, it should address both incomplete mitigation for impacts from the CVP as it exists today as well as potential impacts from increased marketing of additional water. Due to water exchanges in the Delta, these impacts may occur anywhere within the Sacramento, San Joaquin, and Trinity River systems. A few examples would be: changes in reservoir levels and temperature, alterations of river flow and temperature, the introduction of toxic materials into waterways, and the reduction of available water to waterfowl and other wildlife. If the lead agencies believe that there cannot be full mitigation, the reasons for this should be explained and dealt with.

We note that the Bureau in several documents has stated that fish and wildlife goals need to be dealt with comprehensively for the entire area affected by the CVP (An Appraisal of Total Water Management in the Central Valley Basin, California, 1972; Working Document 12, 1978; CVPWMS Newsletter, April 1982; CVPWMS Report B-7, 1984).

At this time we do not intend to list all unmet mitigation measures needed for the COA for the CVP as it exists today, or for the marketing of additional water. This job should be completed by the lead agencies responsible for the EIR/EIS on the COA. However, we believe this task could be facilitated by the formation of a state/federal interagency task force comprised of the lead agencies and the federal and state fish and wildlife agencies. We have previously suggested the formation of this task force.

The task force would, in effect, assist with the completion of the DEIR/EIS or other appropriate documents to ensure all needed issues are addressed. We would work expeditiously on such a task

force to complete this analysis before the time the Bureau is ready to market additional water and hopefully before the COA is signed.

As we have stated previously, provided that the EIR/EIS fully addresses our concerns and/or provides a commitment that would lead to a satisfactory resolution of all fish and wildlife problems related to the operation of the overall CVP, DPC supports the signing of the COA. The COA itself is silent on issues outside the Delta, but to be placed in the proper perspective, decision makers need information on all the issues which are related and these should be addressed or scheduled to be properly addressed.

We are eager to share the burden of this task.

Sincerely,

Jack C. Farnell
for Jack C. Farnell
Director

NATIVE AMERICAN HERITAGE COMMISSION

915 Capitol Mall, Room 208
Sacramento, California 95814

(916) 322-7791

October 31, 1985

Karl Winkler
Department of Water Resources
1251 S. Street, Room D-4
Sacramento, CA 95816

Draft EIS/EIR for the Proposed Coordinated Operation Agreement for the
Re: Federal Central Valley Project and the California State Water Project
SCH# 85092303

The Native American Heritage Commission appreciates the opportunity to express its concerns and comments in the environmental review process. As you may know, the Commission is mandated to preserve and protect places of special religious or cultural significance to Native Americans pursuant to Section 5007 et seq of the Public Resources Code.

The Commission has the further responsibility of assisting Native Americans in cemetery and burial protection pursuant to Section 5097.94(h) of the Public Resources Code. Should human remains of Native American origin be encountered during the project, we request that the County Coroner's Office be contacted pursuant to the procedures set forth in Section 7080.8 of the Health and Safety Code.

In order to mitigate potential impacts to California Indian ancestral burials and other cultural resources during the course of this project, we request that you consult with Indian individuals and/or groups in the project area.

Please do not hesitate to contact the Commission for any assistance relative to the above.

Very truly yours,
John Darvish-Smith
John Darvish-Smith
Executive Assistant

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November 8, 1987

Karl Winkler
Department of Water Resources
3251 S Street, Room D-4
Sacramento, CA 95816

Subject: Draft EIS/EIR for the proposed Coordinated Operation Agreement for the Federal Central Valley Project and the California State Water Project. SCH# 85092303

Dear Mr. Winkler:

The State Clearinghouse submitted the above named draft Environmental Impact Report (EIR) to selected state agencies for review. The review period is closed and the comments of the individual agency(ies) is(are) enclosed. Also, on the enclosed Notice of Completion, the Clearinghouse has checked which agencies have commented. Please review the Notice of Completion to ensure that your comment package is complete. If the package is not in order, please notify the State Clearinghouse immediately. Your eight digit State Clearinghouse number should be used so that we may reply promptly.

Please note that recent legislation requires that a responsible agency or other public agency shall only make substantive comments on a project which are within the area of the agency's expertise or which relate to activities which that agency must carry out or approve. (AB 2583, Ch. 1518, Stats. 1984.)

These comments are forwarded for your use in preparing your final EIR. If you need more information or clarification, we suggest you contact the commenting agency at your earliest convenience.

Please contact Peggy Osborn at 916/845-0613 if you have any questions regarding the environmental review process.

Sincerely,

John B. Chanin
John B. Chanin
Chief Deputy Director
Office of Planning and Research

cc: Resource Agency

Enclosures

8

85092303

Draft EIS/EIR for the proposed Coordinated Operation Agreement for the Federal Central Valley Project and the California State Water Project

Department of Water Resources, Karl Winkler
Bill Elbert, State Board of Water Control
State Clearinghouse

SEP 23 1987
STATE CLEARINGHOUSE

The Proposed Act of signing and implementing the proposed Coordinated Operation Agreement obligates both the Central Valley Project and the State Water Project to meet water quality and welfare standards from The State Water Resources Control Board Section 1403 designed for protecting the beneficial uses of the Sacramento-San Joaquin Delta water supply.

Peggy Osborn
9/25
10/
11/6
11/8

AGENCY	DATE	REMARKS
STATE BOARD OF WATER CONTROL	9/25	
STATE BOARD OF WATER CONTROL	10/	
STATE BOARD OF WATER CONTROL	11/6	
STATE BOARD OF WATER CONTROL	11/8	

9

Memorandum

To: Karl Winkler
Department of Water Resources
3251 S Street, Room D-4
Sacramento, CA 95816

Date: November 7, 1985

Lloyd Johnson
Lloyd Johnson
Interim Chief
DIVISION OF WATER RIGHTS
STATE WATER RESOURCES CONTROL BOARD

Subject: COMMENTS ON THE JULY 1985 DRAFT ENVIRONMENTAL IMPACT STATEMENT AND ENVIRONMENTAL IMPACT REPORT (DRAFT EIS/EIR) ON THE PROPOSED COORDINATED OPERATION AGREEMENT (COA) BETWEEN THE FEDERAL CENTRAL VALLEY PROJECT (CVP) AND CALIFORNIA STATE WATER PROJECT (SWP)

A copy of your draft EIS/EIR that was sent to the State Water Resources Control Board (State Board) has been referred to me for review and comment. My general comments are provided below. More detailed comments are attached.

In general, we consider that the draft EIS/EIR fairly describes a sound environmental basis for selecting the COA over potential alternatives. However, we believe the proposed COA contains certain environmental flaws that are not adequately described in the draft EIS/EIR.

Most notably, the draft EIS/EIR asserts that the central purpose of the COA is to give in-basin needs, including Delta water quality protection, priority over CVP and SWP exports from the Delta. This is not entirely correct because:

1. The COA contains provisions for terminating obligations to meet the Exhibit A Delta standards if the SWP and CVP fail to enter into new contracts to increase exports from the Delta or fail to obtain new water rights to enable these new export contracts. Thus, the termination provisions of the proposed action appear to give new exports priority over Delta water quality protection.
2. Contrary to statements made in the draft EIS/EIR, meeting the Exhibit A Delta Standards, which were extracted from the State Board's Decision 1485, does not assure that all upstream in-basin uses in the Sacramento River and San Joaquin River basin are protected from CVP and SWP operations.

Karl Winkler

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3. The proposed action does not assure protection of in-basin uses downstream of the Delta in Suisun Marsh and San Francisco Bay.

Consequently, we believe the environmental analysis in the Draft EIS/EIR should be modified to take into account the flaws in the proposed action described above. Other changes should be made in accordance with our attached detailed comments.

Thank you for the opportunity to comment on your draft EIS/EIR. If you have any questions, please call me at (916) 324-5730 or call Mr. David Beringer, Bay-Delta Program Manager, at (916) 322-9870.

Attachment

cc: Bob Schroeder (w/attachment)
U.S. Bureau of Reclamation

Attachment

DETAILED COMMENTS ON THE JULY 1985 DRAFT ENVIRONMENTAL IMPACT STATEMENT AND ENVIRONMENTAL IMPACT REPORT (DRAFT EIS/EIR) ON THE PROPOSED COORDINATION OPERATION AGREEMENT (COA) BETWEEN THE FEDERAL CENTRAL VALLEY PROJECT (CVF) AND CALIFORNIA STATE WATER PROJECT (SWP)

1. Page 3-3, Left Column:

The first full paragraph states in the last sentence that the COA provides that if the parties fail to reach agreement on the purchase and conveyance contract called for in COA Article 10(b), the COA may be terminated by either party under Article 14(b). This directly conflicts with assertions made on page 3-2, left column, third paragraph that the purpose of the COA is to give Delta water quality protection priority over exports from the Delta. The final EIS/EIR should specifically address this inconsistency.

If the COA can be terminated upon failure to execute new contracts to increase exports from the Delta, then the COA may actually be giving priority to new exports over Delta water quality. Therefore, the final EIS/EIR should address the possibility that the proposed action (COA) may not be better than the No Action alternatives.

2. Page 3-9, Table 3-1:

The first footnote appears to indicate that none of the disadvantages listed for the various alternatives are significant adverse impacts based on CEQA criteria. While this may be true relative to the proposed action, it certainly is not true relative to the other alternatives, especially No Action, Case A. The final EIS/EIR should correct this error.

3. Page 7, Right Column:

The paragraph discussing COA Article 4 lists the various conditions under which the COA may be terminated. Our concern relative to the condition where the parties fail to reach new contracts for increased exports has already been expressed in item 1 above. Another condition given refers to COA Article 10(b)(5), which states that if either party fails to obtain sufficient new water right permits or amendments to existing permits that will enable execution of new contracts to increase Delta exports, this can be grounds for terminating the COA. Again, we see this as another flaw in the COA that undermines statements made in the draft EIS/EIR that the primary purpose of the COA is to give Delta water quality protection priority over exports. It is

conceivable that the parties may not be able to obtain all the water right permits or permit changes they want to cover new export contracts, simply because there may not be sufficient water available for appropriation. Yet this termination provision in the COA would allow the parties to abandon obligations to mitigate their effects on the Delta under current exports if water rights for new exports which might deprive existing beneficial uses are not approved. Therefore, we believe the termination clause of COA Article 10(b)(5) could render the COA to be no better environmentally than the No Action alternatives. This possibility should be fully addressed in the final EIS/EIR.

4. Pages 7-8:

The discussion relative to COA Article 6 describes how the sharing formulas coupled with the Exhibit A standards in the COA define how the CVF and SWP will coordinate operations to share both available water supplies and responsibility to maintain Sacramento Valley in-basin use. Further the argument is made on page 8, left column, third full paragraph, that all in-basin use requirements (including apparently those in the San Joaquin Valley basin) are being met if the Exhibit A Delta standards in the COA are met, because:

- a. the Delta is downstream of all other in-basin uses; and
- b. the Delta gets only the water that remains after upstream uses have been satisfied.

Based on this argument, the draft EIS/EIR concludes on page 3-2, left column, third paragraph that the COA meets the needs of the areas of origin. Both the conclusion and supporting argument are in error and should be corrected in the final EIS/EIR.

The Delta flow and salinity standards in Exhibit A are derived from Board Decision 1485. These Delta standards were designed only to protect certain prior rights and beneficial uses in the Delta insofar as they may be affected by the CVF and SWP. As such, they were neither intended to, nor do they necessarily confer, appropriate flow or salinity protection to satisfy all upstream in-basin uses of water in the Sacramento and San Joaquin Valleys.

While salinity limits in the Delta may protect Delta users from seawater intrusion, this does nothing to assure that upstream users are protected from local sources of salt discharges (such as agricultural return flows into the San Joaquin River) potentially related to the CVF and SWP. Moreover, satisfaction of Delta flow requirements by the CVF and SWP does not guarantee that the water supply needs of all upstream users are being met or that none are being

locally affected by CVF and SWP operations. Therefore, the final EIS/EIR should not claim in any way that the COA protects all in-basin users upstream of the Delta. Nor should it claim that all beneficial uses that may have priority over the projects, including those in Suisun Marsh and San Francisco Bay, are satisfied.

5. Page 12, Right Column:

The first paragraph explains in the last sentence that under COA Article 10(b), the SWP will pump by April 30 of the following year up to 195,000 acre-feet of CVF water foregone due to CVF export restrictions the previous May and June. This provision is based on Order Condition 3 of Decision 1485. However, as explained to the parties in a letter from the Board dated April 12, 1984, such makeup wheeling is allowed only through March 31 of the following year, not through April 30. Appropriate corrections should be made in both the final EIS/EIR and the COA.

6. Page 25, Left Column:

In the third paragraph, change the date the Board expects to complete the revised standards from 1988 to 1989.

7. Page 4, Left Column:

The errata sheet given with the draft EIS/EIR properly corrects the misstatement in the first paragraph that Decision 1485 did not include standards to protect offshore M & I water quality for Contra Costa County. However, this correction should be carried over into the next two paragraphs as follows:

- a. the first sentence of the second paragraph should include the following additions (underlined):

"Under Decision 1485, chloride content of the water at either Rock Slough or Antioch Water Works Intake of the San Joaquin River is required to be 150 ppm or less for a minimum of 155 days per year and Rock Slough may not exceed 250 ppm."

- b. The first sentence of the third paragraph should be changed as follows:

"Although not established by Decision 1485, suitable water conditions in the area are available for direct diversion in the Antioch-Pittsburg area for varying amounts of time, depending on prevailing hydrology."

*R. L. ...
1/12/85*

8. Page 50, Right Column:

The last sentence correctly states that April is the month of highest concern with regards to striped bass spawning. This is precisely the reason for the Board's wheeling limitation discussed in comment No. 5 above.

9. Page 51, Left Column:

The last sentence of the second paragraph states that higher exports impact young striped bass more in May through August than in fall and winter. While this may be true in above normal water years, the Department of Fish and Game is beginning to discover that increased exports in the fall of dry years may damage young bass much more than previously expected, since low outflow tends to keep more of the bass in the central Delta (where they are more susceptible to impingement and entrainment at the export pumps) rather than flushed into the Bay. The final EIS/EIR should be corrected to reflect these new findings, particularly in view of the fact that the alternatives being analyzed only differ in terms of action taken in dry years.

10. Page 58, Right Column:

The third paragraph under "No Action" asserts that operating to Tracy standards in critical years rather than the Exhibit A standards would not change exports during the period of maximum abundance of striped bass eggs and larvae in the Delta (presumably April through August). Thus, the conclusion is reached that No Action, Case A would be no worse than the proposed action relative to striped bass. We disagree and consider that No Action, Case A should be described in the final EIS/EIR as worse for striped bass for reasons similar to those given on page 59 relative to the adverse impacts of No Action, Case A on Salmon.

The first full left-hand paragraph on page 59 states that operating to Tracy standards in critical years would increase the frequency and magnitude of reverse flows in the lower San Joaquin in April and reduce Sacramento River flows in April through June. Moreover, the next paragraph admits that increases in exports during May through July over the Exhibit A limits would not be ruled out under No Action, Case A. Since No Action, Case A appears to be cast as the "worst case" alternative environmentally for the Delta, against which the other alternatives are measured, it does not seem logical to assume that exports would not increase in the absence of Exhibit A standards to the detriment of young striped bass between April and September. This would be consistent with the general conclusion drawn in the first right-hand paragraph on page 59 that No Action, Case A would be more harmful to Delta fish than the proposed action.

11. Page 97, Right Column:

The fourth paragraph discusses the Bureau's intent to propose lifting the Department of Interior's moratorium on the Bureau entering into new long-term water service contracts once the COA is executed. The final EIS/EIR should clarify whether the Bureau intends to proceed with such a proposal in the absence of a separate agreement with the Department of Water Resources to provide permanent protection for Suisun Marsh.

10

DIRECTORS
CLARK W. REDEKER
President
FRANK BORGAS JR.
HARRY D. BRAUNBAUGH
JOSEPH O. DAMAS JR.
ARL H. STRANDBERG

ALAMEDA COUNTY WATER DISTRICT

Handwritten notes and signatures:
NOV 13 1985
HME
Mark
10/16
10/16
10/16

NOTED
NOV 13 1985
HME

OFFICERS
ROY E. COVERDALE
General Manager
ANDREW J. GERACHTY
AUCTIONEER
RUTH R. EVANS
District Secretary

November 7, 1985

Mr. David H. Kennedy
Director
California Department of Water Resources
P.O. Box 388
Sacramento, CA 95802

Karl Winkler
Central District
3224 S St.

COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT, COORDINATED OPERATION AGREEMENT, CENTRAL VALLEY PROJECT/STATE WATER PROJECT

The Alameda County Water District supports adoption of the Coordinated Operation Agreement for the Central Valley Project and the State Water Project. The agreement is needed to provide increased water supplies for the State Water Project and for environmental protection of the Delta.

The District receives about 60 percent of its firm water supply from the State Water Project. The current annual entitlement is 30,800 acre feet and it will grow to 42,000 acre feet in 1994. Therefore, the increased water supply that the Coordinated Operation Agreement makes available to the State Water Project is extremely important to the District.

The District is located in the San Francisco Bay Area and we are concerned about the well being of the Delta. We are pleased that the Coordinated Operation Agreement provides greater protection to the water-related environment in the Delta as stated on page 6-7 of the Environmental Impact Statement/Report.

Thank you for the opportunity to comment.

Signature of Roy E. Coverdale
ROY E. COVERDALE
General Manager

NOTED
NOV 13 1985
HME

Handwritten notes:
Karl Winkler
10/16

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CENTRAL VALLEY PROJECT WATER ASSOCIATION

703 Nite Blvd., 921-11th St., SACRAMENTO, CALIFORNIA 95811
TELEPHONE (916) 442-9777

OFFICERS
RAJPH A. WISSER, Pres.
URCIL CABBY, Vice Pres.
JURALO B. BUTCHERTY
JACK CAMPBELL
HARVEY S. CRAIG
JAMES RICHMOND
FRANK IDROS, JR.
JOSE P. CILIBERTY
DAVID P. CARABICHIO
BRIE PUSKAS
W.A. CATINO, Manager

November 12, 1985

Mr. Robert Schroder
Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, CA 95825-1898

Mr. Karl Winkler
Department of Water Resources
3251 S Street, Room D-4
Sacramento, CA 95816

Gentlemen:

Reference is made to your letter attached to EIS/EIR dated September 18, 1985, for the proposed Coordinated Operation of the Federal Central Valley Project and the California State Water Project which requests comments on the report.

On page 5-3, first full paragraph and first sentence, states "for the purchase of interim CVP water by the SMP." This should be changed to: "for the annual purchase of interim and intermittent CVP water by the SMP after it has been initially offered to CVP water contractors and . . ." This suggested change applies in a number of other passages in the report.

Further, on the sale of CVP water to the SMP your attention is called to this Association's letter of October 30, 1985, to Assistant Secretary of the Interior Broadbent. A copy of this letter is attached.

We appreciate the opportunity to respond to your report.

Sincerely yours,

Signature of M.A. Catino
M. A. Catino
Manager

Attachment

cc: Board of Directors

Handwritten notes:
180
10/16
10/16
10/16
10/16

5865 NOV 13 1985

11

CENTRAL VALLEY PROJECT WATER ASSOCIATION

703 Nite Blvd., 921-11th St., SACRAMENTO, CALIFORNIA 95811
TELEPHONE (916) 442-9777

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JOSE P. CILIBERTY
DAVID P. CARABICHIO
BRIE PUSKAS
W.A. CATINO, Manager

October 30, 1985

Robert N. Broadbent
Assistant Secretary of Interior
for Land and Water Resources
Interior Building
Washington, D.C. 20240

Dear Mr. Broadbent:

On several occasions you have been apprized of this Association's interest in the proper distribution of the remaining Central Valley Project (CVP) firm water supply to the current and potential CVP contractors. This supply is equal to the partitioning of water supplies as provided for in the Coordinated Operations Agreement between the CVP and the State Water Project (SMP).

We are certain you realize that any available and uncontracted firm water supply in the Central Valley of California holds a high degree of interest among those in need of augmentation. With this in mind and in view of the demand requirements exceeding availability, this Association committed itself to straight-forward analysis of the current and potential irrigation and municipal and industrial water needs of its contractors. We formed several committees from our user membership to develop an equitable understanding. Meetings and correspondence with the Mid-Pacific Regional Director have aided our understandings.

The efforts of our committees were directed toward an "Inventory of Water Needs" and a "Proposed Criteria and Principles for Governing the Contracting for the Remaining CVP Firm Water Supply."

Relative to the inventory, the conclusions provide a firm water supply need of 1.9 million acre-feet. This amount when compared to the CVA-CVP availability of 1.1 million acre-feet indicates a shortage of 800,000 acre-feet. When consideration is given to a CVP interim supply (water supply under contract but not being used by the contractor) of 600,000 acre-feet and a

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LVP intermittent supply of 540,000 acre-feet there is the possibility of carrying the shortage for a period of time until new CVP facilities are constructed for firming supplies. However, this is not the present case for SMP contractors whose future water needs are aligned to a quantity of 4.2 million acre-feet and an availability of 2.1 million acre-feet for a shortage of 2.1 million acre-feet.

For your information, the results of our inventory by CVP facilities and service areas are shown below. A specific amount for a district/individual contractor is omitted because this is part of the negotiating process which includes land classification, cropping patterns, availability and quality of ground water, economic benefits and other elements.

SUMMARY BY SERVICE FACILITY (Additional Requirements)

	Acro-feet
Shasta Dam Area (Shasta County)	15,000
Folsom Dam Area (Exclusive of Folsom-South Canal)	28,000
Sacramento River	40,000
Corning Canal (Tehama County)	64,000
Tehama-Colusa Canal (Glenn-Colusa-Yale Counties with some service to Siskiyou County via a completed Det Reservoir)	393,000
Delta-Mendota Canal (Including Mendota Pool)	180,000
San Luis Canal Service Area	400,000
San Felipe Unit (Includes 20,000 reserve to Monterey and Santa Cruz Counties)	27,000
Mid-Valley Group (Chuchilla to Bakersfield)	163,000
TOTAL - CVP Contractors Firm Water Supply Requirements	1,910,000

Separate from the above, is the additional water requirement of the Indian South Canal Service Area. Completion of the Folsom South Canal from its present Luskamas River Terminus (Sacramento County) through San Joaquin County and even without the completion of Adams Dam could provide up to 400,000 acre-feet. This requirement will need consideration within future LVP water sales.

Generally, we feel the above amounts are realistic. The range of future requirements by Districts is from less than 1 acre-foot/acre to an average of nearly the same 3 acre-feet/acre. In some cases the increased surface water requirements are to offset the high cost of ground-water pumping and depletion.

A significant element of this presentation is the attached criteria for Bureau of Reclamation contracting with our CVP users. The criteria deal with the priorities and associated contract elements for the augmentation of firm, interim and intermittent water supplies to the CVP contractors. It does not exclude SVP contractors as CVP water purchasers but makes it clear that only annual interim and/or intermittent supplies be contracted to them on a recallable basis.

We conclude that the criteria represent a reasonable basis for contracting and represent a consensus of our membership. We highly recommend your approval of the criteria. Your approval and the concurrent lifting of the moratorium on CVP water sales will provide substantial betterments to the present water conditions of the Central Valley.

We will appreciate your reply to this extremely important matter.

Sincerely yours,

Ralph A. Hissen
President

Enclosure

CENTRAL VALLEY PROJECT WATER ASSOCIATION

Proposed Criteria and Principles Governing
the Contracting for the Remaining CVP Water Supply
(Firm, Interim and Intermittent)

Effective since January 1978, there has been a moratorium imposed by the Secretary of the Interior on further contracting for firm Central Valley Project (CVP) water supply. The Coordinated Operations Agreement (COA) has been agreed to by the CVP and the State Water Project (SWP) for the partitioning of the firm yield of the Project and for sharing of water required to meet the Delta water quality standards. Upon execution of the COA by the Bureau of Reclamation (BOR) and the Department of Water Resources (DWR), it is expected that the moratorium will be lifted and that the BOR will proceed with contracting for the remaining firm CVP water supply.

A. Contracting Entity: (Qualifications)

The term "Contracting Entity" as hereinafter used means an agency authorized by law to contract for a CVP water supply, either directly with the United States or through an agency formed for that purpose.

1. is within the Congressionally authorized CVP service area; and
2. is within the Place of Use recommended by the Central Valley Project Water Association (CVPWA) and adopted by the BOR in its petition dated September 19, 1965, to the State Water Resources Control Board (SWRCB) for consolidation and enlargement of the Place of Use under existing CVP permits and licenses. The conditions of the permits and licenses appropriately recognize the "Quality of Origin" and "Waterbed Protection" provisions as contained in the Water Code, Sections 10545 and 11460 et. seq., respectively; and
3. is willing to comply with the provisions of the Reclamation Reform Act of 1982; and
4. agrees to use the water for the preservation of existing developed lands; and
5. agrees to accept an allocation of new or additional firm CVP water supply based upon assumed full utilization of the safe yield of its ground water and local surface supply considering quality and economics; and

6. agrees to a development period within its control for a term of not to exceed 5 years in which to execute a contract, and thereafter a build-up period of water deliveries and repayment not exceeding 5 years. (Generally a contract entity will be required to enter into a contract within a period of 5 years and fully utilize the contracted water supply within 5 years. However, if a contract is consummated within 3 years, a 3-year period will be allowed for the development period. Accordingly, the total time would be 7 years). The above build-up of 5 years is related to irrigation. A longer period will be required for municipal and industrial water contractors.

The proposed criteria for allocation of the uncontracted firm CVP water supply, in order of priority, shall be as follows:

B. Priorities:

1. A contracting entity that is an existing long-term CVP contractor in need of water supply augmentation as a result of reduced usable ground water yield, a reduction in local surface water supply, or an acceptable inclusion and having available capacity within its existing distribution system.
2. A contracting entity that is within an overdrafted ground-water basin and has previously held a "short-term" or "temporary" CVP water service contract with the BOR.
3. A contracting entity that has a pending application with the BOR for a CVP allocation and has the capability of applying additional water supply to reasonable beneficial use.
4. A contracting entity that is newly formed without a previous contracting relationship with the BOR for a CVP water supply.

Interim CVP Water Supply (Water supply under contract but not being used by the contractor) shall be made available to a contracting entity subject to recall, in conformity with the same criteria and order of priority as outlined above for firm CVP water supply and with an additional priority as follows:

5. The Department of Water Resources for the SWP as envisioned under the COA.

Intermittent CVP Water Supply shall be allocated in the following order of priority:

1. A contracting entity that conforms to items A.1 through A. 6, as listed above.
2. A contracting entity that is within an overdrafted ground-water basin and has the capability of accomplishing ground-water recharge.
3. A contracting entity that is in need of additional CVP water supply.
4. For U.S. Fish and Wildlife Service, California Department of Fish and Game, and Wildlife refuge requirements.
5. For enhancement in the Trinity River Fishway as required from factual study beyond the 120,000 acre-foot annually included in the COA yield studies.

DIRECTORS
MANAGER
GENERAL MANAGER
ASSISTANT MANAGER
S. DISTRICT MANAGER
GENERAL MANAGER

12

COLUSA COUNTY WATER DISTRICT

P. O. BOX 107
HEAVENLY, CALIFORNIA 95920
TELEPHONE 925-266-0100

October 24, 1985

Regional Environmental Officer
U. S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825-1898
Attn: Bob Schroeder

Dear Mr. Schroeder:

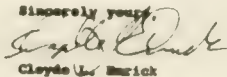
Thank you for furnishing a copy of the draft EIS-EIR for the Coordinated Operation Agreement. I would like to submit the following comment regarding Page 8-1 of the Summary, Description of the Proposed Action (Paragraph 2):

The "essence" of the "formula" is described "to first meet the needs in the areas of origin, including the Delta.... Only then is water exported from the Delta."

This is a false and misleading statement and should be corrected to read "to first meet the needs of the Delta water quality standards and flow requirements contained in Exhibit A. The remaining water supply in dry years will be distributed evenly to all contractors regardless of area of origin considerations."

It should be abundantly clear to anyone reading Exhibit B of the agreement that water will be exported from the Delta in water short years without priority to the area of origin except the Delta and without meeting the full needs of the area of origin users. To say it is not so in your report does not change the facts.

Sincerely yours,



Clyde W. Erick

CLB: lv

Handwritten notes on a grid form, including the number 730 and a date 11/25.

Water Agency

13

Contra Costa
County
Water Agency



November 13, 1985

Board of Supervisors
EIR-Office Governing Board:

Tom Powers
for District
Honorable C. P. Fisher
3rd District
Robert A. Schneider
2nd District
3rd District
Sandra Wright
4th District
Tom Tuley
5th District

FS-2

Karl Winkler
Department of Water Resources
3251 S Street, Room D-4
Sacramento, CA 95816

Dear Mr. Winkler:

This letter is to submit comments from the Contra Costa County Water Agency on the Draft Environmental Impact Statement and Environmental Impact Report (EIS/EIR) on the proposed Coordinated Operation of the Federal Central Valley Project and the California State Water Project. The Contra Costa County Water Agency is governed by the Board of Supervisors of Contra Costa County. An oral statement that was authorized by the Board of Supervisors was presented at the October 22 and November 7 public hearings. A copy of the statement is attached.

The Contra Costa County Water Agency supports the Coordinated Operation Agreement and HR 3113 which would authorize the Secretary of the Interior to execute the Agreement. We note that the Coordinated Operation Agreement lacks a commitment by the federal government to share responsibility for meeting future water quality requirements set by the State Water Resources Control Board. Although we expect these water quality requirements to change within the next few years, we feel that the Coordinated Operation Agreement is a step in the right direction. However, we do have some concerns about the Draft EIS/EIR.

General Comments

1. Throughout the document, there is an assumption that Decision 1485 water quality standards, which are included in the Agreement, will protect water quality and other environmental qualities in the Bay/Delta estuary. We strongly disagree with this assumption. The past several years have shown the inadequacy of the water quality standards in Decision 1485. Also, Decision 1485 was rejected by the Courts as improperly promulgated. If the Draft EIR/EIS is to make the assumption that Decision 1485 adequately protects environmental values, detailed information must be provided to document the validity of this conclusion.
2. An analysis of the various methods by which the Agreement can be terminated, either unilaterally or by both parties, should be evaluated. There appears to be many ways for both parties to terminate the Agreement.

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Karl Winkler
Page 2
November 13, 1985

3. The Agreement provides for approximately 900,000 acre-feet of water to be "made available" from the Central Valley Project after execution of the Agreement. The Draft EIS/EIR discusses possible uses of this water, including sale to other contractors. The Draft EIS/EIR should include an analysis of the benefits to the Bay/Delta estuary if this amount of water was used to improve water quality in the estuary by allowing the water to flow through and out of the Delta. Similarly, the Draft EIS/EIR should identify adverse effects of additional export of water, particularly on striped bass and salmon. The impacts of reduced amounts of water in tributary rivers and the Bay/Delta estuary should be fully evaluated.
4. The Draft EIS/EIR states that the effects of the Agreement on Suisun Marsh will be addressed in the environmental documents on the proposed "Suisun Marsh Agreement". This is not acceptable because there is no guarantee that the future environmental documents will adequately address water quality and fishery aspects of Suisun Marsh water quality, due to the emphasis of the proposed "Suisun Marsh Agreement" on waterfowl. The Draft EIS/EIR should fully document the effects of the Coordinated Operation Agreement on water quality and fish in the vicinity of Suisun Marsh.
5. The Draft EIS/EIR should include an analysis of the amounts and environmental effects increased agricultural drainage from the San Joaquin Valley resulting from the increased water diversions to Valley agriculture possible after the execution of this Agreement.

Specific Comments

1. On page 42, there is a paragraph concerning Delta outflows to Suisun Bay, San Francisco Bay, and to the ocean stating that tidal influences tend to overwhelm fresh water flows once they get beyond the Delta. This implies that Delta outflows are insignificant compared to tidal influences. There is no documentation to show that this conclusion is true and appears to be contradictory to recent findings concerning the necessity of flows to stratify various parts of San Francisco Bay. Fresh water flows are important to the health of the Bay.
2. On page 74, the statement is made "to the extent that any water saved by operating for the Tracy standards rather than for the Exhibit A (Decision 1485) standards would be released instead of retained in the reservoirs, the environmental consequences of no action would approach those of the proposed action as far as rivers and reservoirs are concerned." This statement may be correct for rivers and reservoirs upstream of the Delta but is not true for the western Delta and the estuary system downstream of the western Delta which would be adversely affected by additional diversions from the Delta resulting from a relaxation of water quality standards.

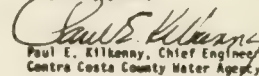
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Karl Winkler
Page 3
November 13, 1985

3. On page 84, there is a short discussion concerning Friant Dam and Millerton Lake. Friant Dam is located on a stream tributary to the San Joaquin River. The San Joaquin River is one of the major tributaries to the Delta. An explanation should be made as to why water diversion facilities on the San Joaquin River (such as, Friant Dam and New Melones Dam) are not governed by this Agreement and why they are not expected to contribute to Bay/Delta water quality. These facilities could play a major part in improving water quality in the South Delta. Non-consideration of major storage facilities on the San Joaquin Valley is a major omission of the Agreement. The environmental consequences of this omission should be fully addressed.

If you have any questions, please contact Dave Deits of the Community Development Department at 415/372-2071.

Very truly yours,



Paul E. Kilbenny, Chief Engineer
Contra Costa County Water Agency

BB0:1
sm.l.winkler.ttl

Attachment

14
NORTH DELTA WATER AGENCY

705 ELIOT BUILDING, 801 - 11th STREET, SACRAMENTO, CALIFORNIA 95814
TELEPHONE (916) 445-6707

W. P. Davis, Chairman
Leo Olson, Jr. Vice Chairman
Edward B. Ryan, Secretary/Treasurer
Henry H. Kuntzler, Jr., Director
Charles Leary, Chairman
George Stapp, Chairman
D. E. Hansen, Designer
M. A. Catino, Attorney

November 12, 1984

Mr. Robert Schroder
Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, CA 95825-1898

Mr. Karl Minkler
Department of Water Resources
3251 S. Street, Room D-4
Sacramento, CA 95816

Gentlemen:

reference is made to your letter attached to EIS/EIR dated September 18, 1985, for the proposed Coordinated Operation of the Federal Central Valley Project and the California State Water Project which requests comments on the report.

Our comments should be considered as a joint response by this Agency and the California Central Valleys Flood Control Association. They are as follows:

- On page 55 - The report indicates a benefit to Delta Agriculture because of the "Hydraulic Connections to the Delta Cross Channel." There is no indication as to the project's operations impact on the Delta levee systems that support the flows to the Tracy and Delta Pumping Plants. Generally, the CVP and SWP water supplies follow through from the Delta Cross Channel into Snodgrass Slough, North and South Forks of the Mokelumne Rivers (adjacent to Tyler and Statan Islands) and southward across the Delta to the pumping plants. In our analysis there is a lack of accounting for the impact of the above diversion on all of the Delta levee systems. Your attention is called to the July 19, 1984 letter from the Director, Department of Water Resources, copy attached, which acknowledges the "continuing impacts upon the channels."
- On page 69 - Under "Seepage" it is acknowledged that at "critical stages" along the Sacramento River that seepage will occur to adjacent lands. This seepage impacts early farm plantings and delays harvesting dates. Also, there are impacts on Sacramento River levees and adjacent farm lands and orchards because of the project's operations.

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- On page 68 - North Delta Water Agency Contract - The water quality requirements of this Agency as provided in the contract with DWR are identified and we are gratified that the Department is bound to the contract regardless of future changes in Decision 1485 standards.

Further under this item, relative to construction of Sherman Island facilities, it should be acknowledged that assumption of operation and maintenance by the Agency or transferee would be at State Water Project expense.

We appreciate the opportunity to review and comment on the Draft Report.

Sincerely yours,

M. A. Catino
Manager

Enclosure

- cc: M. R. Dersie, Chairman, NDMA, w/enclosure
George C. (Tim) Wilson, President, CVWCA, w/enclosure
James Shanks, Reclamation District No. 38, w/enclosure
David Granicher, Reclamation District No. 108, w/enclosure
George Basye, Esq., Downey, Brand, Seymour & Rohrer, w/enclosure
Don Kianlon, Murray, Burns & Kianlon, w/enclosure

14
STATE OF CALIFORNIA - THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
P.O. BOX 188
SACRAMENTO, CA 95833

GEORGE BRIDGMAN, DIRECTOR



JUL 19 1984

Mr. Michael A. Catino, Manager
North Delta Water Agency
921 - 11th Street, Room 703
Sacramento, CA 95816

Dear Mr. Catino:

Re: Channel Work in the North Delta

This letter is a response to issues raised at recent meetings attended by Department staff and North Delta interests.

The Department recognizes that there have been continuing impacts upon the channels of the Mokelumne River caused by the federal cross channel through which water of the federal Central Valley Project and some water of the State Water Project now flows. The Department of Water Resources (DWR) will attempt to address this issue in consultation with the Agency, Reclamation Districts and landowners and seek the cooperation of the United States Bureau of Reclamation in the analysis and solution of existing problems.

The Department of Water Resources is also aware of Delta landowner concerns that in proceeding with a State project we would attempt to limit our responsibility for erosion control to only those areas of actual construction as has been the history of the federal cross channel. This is not the case. We intend to analyze and examine conditions in the Delta to be sure we do not cause flow changes that could be reasonably considered to cause measurable adverse impacts without mitigating such impacts.

It is recognized that existing preliminary design information may be insufficient to accurately project velocities and stages of channel flows. However, as detailed design and construction proceeds, the Department will prevent or correct erosion or seepage problems attributable to the project. Should operational experience of completed works reveal unforeseen impacts attributable to DWR actions, they will be corrected.

The contract between the State and the North Delta Water Agency dated January 28, 1981, provides in Article 6 for the repair or alleviation of any erosion or water level impacts caused by the State Water Project upon users within the Agency. I concur that a supplemental agreement with the Agency should be agreed upon prior to construction of channel work in the North Delta envisioned in SB 1369 to implement this contract provision, existing Water Code sections 12627.3, 12627.4 and section 12627.5 proposed for SB 1369.

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Mr. Michael A. Catino
Page 2

JUL 19 1984

The supplemental agreement between the State and the Agency, and the State's commitment to Reclamation Districts and landowners abutting effecting channels, will cover at least the following points:

- (a) Designation of an employee by DWR to be responsible for liaison with the Agency, Reclamation Districts and landowners.
- (b) Appointment by the Agency of an advisory committee to the Department on such matters as the selection of project design criteria, construction specifications, alignment and right-of-way requirements. This would include recreational features.
- (c) Provision to the Agency by DWR of all applicable records and files relevant to and indicative of flows and seepage from the channels in the North Delta. This information will be made available prior to the agreement if requested by Agency.
- (d) Provision for detailing maintenance standards and appropriate sharing of financial responsibility for maintenance among the Department and Reclamation Districts.

If you need further information, please contact me at (916) 445-6583.

Sincerely,

David M. Kennedy
Director

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Northern California Power Agency

180 Carby Way, Roseville, California 95678

MICHAEL W. McDONALD
General Manager
(916) 781-4200

November 16, 1985

Mr. Bob Schroeder
Bureau of Reclamation
Department of Interior
2800 Cottage Way
Room W-2137
Sacramento, CA 95825

Subject: Comments on EIS/EIR - "Coordinated Operation Agreement"

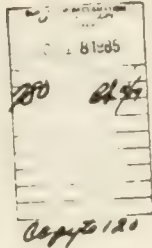
Dear Mr. Schroeder:

Comments

This letter is in response to the September 18, 1985 notice inviting comments on the draft EIS/EIR for the proposed Coordinated Operation Agreement (COA) between the Federal Central Valley Project (CVP) and the California State Water Project. The Customer Technical Committee (Committee), which is composed of and advises the Western Area Power Administration's preference power customers, supports the implementation of the concepts in this agreement. The Committee is very concerned, however, that the COA has not provided sufficient consideration to the maximum efficient power production of the CVP.

As an example, the Committee is concerned that by the noninclusion of New Melones Dam as a federal facility (refer to page 83), the flexibility of the CVP operation is decreased, especially with respect to power production. As explained in Appendix 6, the status of New Melones Dam at the time the operation studies were prepared, was quite uncertain. This resulted because of the State Water Resources Control (SWRC) Board's decision 0-1422, which limited the filling of New Melones Reservoir. Therefore, the noninclusion of the New Melones facility in the past appears to have been appropriate. Now that SWRC Board Order 83-3 (issued March 8, 1983) has removed the obstacle to filling New Melones, and since New Melones is, in fact, being operated to full capacity, the Committee feels that New Melones should be included as a federal facility under Article 5 of the COA.

The draft EIS/EIR asserts that a comparison of the effect of the proposed action vs. the no action alternative on the CVP's power production capabilities, indicates no significant difference in average annual power generation. We do not necessarily dispute these findings, but assume that both studies include New Melones, only operated at the same limited capacity. An analysis of New Melones, operated at full capacity as a fully integrated facility of the CVP, would probably indicate greater average annual power generation potential. Treating New



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Page Two

Melones in this manner will also cause an increase in the Project Dependable Capacity of the CVP, because the Bureau would receive full credit for the portion of New Melones water that can be and is used to meet Delta Water Quality demands. We recognize that New Melones water yield is, ultimately, planned entirely for in-basin use. However, until conveyance facilities are constructed and water demands increase to ultimate conditions, a portion of New Melones water could be made available to meet Delta Water Quality demands, among other CVP requirements, resulting in potential power improvements also.

Recommendation

Because of the potential benefit to the CVP's power production capabilities (of defining New Melones as a federal facility in the COA), the Committee strongly recommends that, upon implementation of the COA by the Bureau and DWR, Articles 14 and 16 be invoked as a vehicle for negotiations to include New Melones Dam as a federal facility as soon as possible.

Sincerely,

Michael W. McDonald

MICHAEL W. McDONALD
NCPA General Manager
Chairman, CVP Technical Committee

cc: Roger A. Fantes
Dave Calman
Dave Houston
George Fraser

MM/YI

16



San Juan Suburban Water District

P.O. BOX 85 - GRANDEVILLE, CALIFORNIA 95622 - (916) 895-2375
6885 AUBURN FOLSOM ROAD, ROSEVILLE, CALIF. 95678 - (916) 791-4114

Jack B. Hansen
General Manager and Secretary
Zane Verhees
Attorney
Dr. Frank B. Clandinin
Consulting Engineer

DIRECTORS

Robert R. Sullivan
President
Kenneth H. Miller
Vice President
Mark E. Verhees
Albert C. Rosenzweig
Clare W. Snyder, Jr.

November 13, 1985

Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, CA 95825

Attn: Bob Schroeder

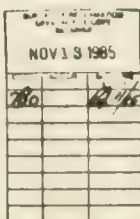
Dear Mr. Schroeder,

Attached you will find the comments of the San Juan Suburban Water District on the draft environmental impact statement per request of September 18, 1985.

If you have any questions concerning the enclosure, please do not hesitate to call me

Sincerely yours,

Jack B. Hansen
JACK B. HANSEN
General Manager & Secretary



JBM:d1
Enclosure

Copy 5: 120

16



San Juan Suburban Water District

P.O. BOX 85 - GRANDEVILLE, CALIFORNIA 95622 - (916) 895-2375
6885 AUBURN FOLSOM ROAD, ROSEVILLE, CALIF. 95678 - (916) 791-4114

Jack B. Hansen
General Manager and Secretary
Zane Verhees
Attorney
Dr. Frank B. Clandinin
Consulting Engineer

DIRECTORS

Robert R. Sullivan
President
Kenneth H. Miller
Vice President
Mark E. Verhees
Albert C. Rosenzweig
Clare W. Snyder, Jr.

November 13, 1985

COMMENTS OF THE SAN JUAN SUBURBAN WATER DISTRICT ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT COORDINATED OPERATION AGREEMENT CENTRAL VALLEY PROJECT/STATE WATER PROJECT, 7/85

The San Juan Suburban Water District receives its water supply from Folsom Reservoir. During dry periods, the low water level within Folsom Reservoir makes pumping necessary to convey the District's water supply to its Peterson Water Treatment Plant

The proposed action of the Coordinated Operating Agreement will have a negative environmental impact on the requirement to provide additional pumping to obtain the Folsom Reservoir water supply to meet the District's water needs. The lower the Reservoir water level the more pumping and higher head to pump against. This is set out in the COA Summary, pages 5-6: The COA, Page 80, Col 2, Paragraph 3, line 10 states "...pumping requirements for water delivered directly from Folsom Lake would be increased and some of the water users relying on this source could experience more severe water shortages."

"Because the Proposed Action would commit a greater amount of CVP water to Delta use and outflow than the CVP might otherwise

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release for this purpose in critical years, critical year water levels in CVP reservoirs under the Proposed Action could be lower than they might be under the No Action alternative. Critical years occur less than 10 percent of the time, and operations during other year types would not significantly affect storage changes. Lower reservoir levels at Shasta, Clair Engle, and Folsom Lakes could occur according to the operating assumptions used in this report and might adversely effect aesthetics and recreation at these lakes."

The COA suggests no significant impact on pumpage requirements or water supply as no mitigating measures are suggested.

It appears from the operation criteria used for Folsom Reservoir that recreational and fish release received consideration where the impact on domestic supply was practically ignored. (page 11).

Page 94 - Possible Conflicts with Governmental Plans

The Multi-District Plan is to supply supplemental water to McClellan Air Force Base, Northridge County Water District, Arcade Water Company, Rio Linda County Water District, Citizens Utility Company, San Juan Suburban Water District, Citrus Heights Water District, Fair Oaks Water District, and Orangevale Mutual Water Company, to reverse the decline of the groundwater table and result in a decrease in energy consumption and which would allow the planned development of northern Sacramento County. This plan has been approved by the Sacramento County Board of Supervisors. The increased pumping and decreased supply as stated on page 80, column 2, would be injurious to this local government plan. This is contrary to the statement under "Possible Conflicts with Governmental Plans," set forth on page 94, column 11.

In conclusion, the San Juan Suburban Water District believes the lowering of Folsom Lake levels and the reductions in the water supply as expressed in the EIS document, page 80, column 2, page 3, constitutes a negative environmental impact of the Proposed Action of the COA. We request mitigation of this impact.

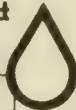
Sincerely,

Jack B. Hansen
JACK B. HANSEN
General Manager & Secretary

Santa Clara Valley Water District

1750 ALAMOGADO EXPWAY
SAN JOSE, CALIFORNIA 95128
TELEPHONE (408) 255-2888

Stamp: NOV 10 1985
Handwritten: 750 R/T



November 5, 1985

Mr. Bob Schroeder
U. S. Bureau of Reclamation
2800 Cottage Way, Room W-2117
Sacramento, CA 95825

Dear Mr. Schroeder:

The Draft Environmental Statement/Report Coordinated Operation Agreement of the Central Valley Project and the State Water Project should be modified as follows:

Page 91, San Felipe Division. In 1977, the U. S. Bureau of Reclamation changed the design of the project from a combined canal and pipeline distribution system to a pressurized pipeline system. The second sentence of the second paragraph of the right column on Page 91 should be replaced by the following sentence:

"From the reservoir, water will flow through the 1.0-mile existing section of Pacheco Tunnel and be lifted by the Pacheco Pumping Plant to the 5.3-mile Pacheco Tunnel Reach 2. From the tunnel, water will be conveyed by gravity through pipelines to the terminal facilities in Santa Clara County and the San Justo Reservoir in San Benito County."

Sincerely,

B. Goldman
Dr. Bernard H. Goldman
Environmental Specialist
Project Development Branch

SOUTH DELTA WATER AGENCY

THE BOARD OF SUPERVISORS
OF THE SOUTH DELTA WATER AGENCY
SOUTHWEST CALIFORNIA REGION
TELEPHONE ROOM 100-1001

- Chairman: Robert Ferguson
- Vice Chairman: Peter Adams
- Secretary: Alan Whitbridge
- Members: Jerry Johnson, Marilyn Beckman

October 8, 1985

740 1265

Waters & Marshes
Ground Water

Mr. Bob Schroeder
U.S. Bureau of Reclamation
2800 Cottage Way
Room W-2137
Sacramento, CA 95825

Re: Draft EIS/EIR re Coordinated
Operation Agreement (COA) CVP/SWP

Dear Mr. Schroeder:

Pursuant to the notice dated September 18, 1985, we are submitting written comments on behalf of the South Delta Water Agency to express our concern over the lack of analysis of possible detrimental effects in the southern Delta caused by increased total Delta diversions as a result of joint operations under the COA.

The SDWA feels that the EIS should correctly and adequately depict the potential impact of the COA on the South Delta, particularly in relation to the potential for worsening the severe loss of agricultural pump draft in some south Delta channels such as occurred during 1985. This will not be a problem if the DWR and the Bureau jointly provide the mitigative measures proposed in the Sept. 1985 letter of intent between the DWR and SDWA. However, these measures are not included in the coordinated operation as we done for the Suisun Marsh per page 8-2. The absence of South Delta standards in the COA and in Decision 1485 is acknowledged on page 47, and the need for mitigative facilities is discussed on page 87. However, elsewhere in the EIS it is alleged that Delta agriculture is fully protected by the COA standards, e.g., page 55 states that the COA "would have no adverse effects on Delta agriculture". This statement disregards the potential under the COA for increases in combined CVP-SWP exports in either the magnitude or duration of combined CVP-SWP peak export rates, as discussed, for example, on page 8-3.

The potential impact of the COA on the south Delta is not mentioned in the discussion on page 8-3, or under

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Mitigation Measures or Cumulative Impacts on page 8-7, or on Table 8-1, or as a "possible adverse impact" at the bottom of page 35, or in Table 5. On page 37 under Mitigative Measures it is stated that "Exhibit A standards of the Proposed Action are mitigation themselves for the projects". This is clearly not true in the south Delta. The impact of the projects and the potential incremental impact under the COA could be mitigated as discussed on page 87, but the COA makes no such provision.

Yours very truly,

WILSON, BOSLETT & WHITRIDGE

By *David Whitridge*
David Whitridge

DM/rdb



TRINITY COUNTY

WEAVERVILLE, CALIFORNIA 96093

BOARD OF SUPERVISORS
P.O. Drawer A-1 (916) 882-4000

November 13, 1985

740 1265

Copy to 120

SARAHAN H. HERRING
Ex-Officio Clerk of the Board of Supervisors

Bob Schroeder
Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, California 95825

Dear Mr. Schroeder:

Please find enclosed a copy of the comments re the Draft Environmental Impact Statement and Environmental Impact Report on the proposed Coordinated Operation of the Federal Central Valley Project and the California State Water Project.

The Trinity County Board of Supervisors adopted these comments at its meeting of November 5, 1985.

Sincerely,
TRINITY COUNTY BOARD OF SUPERVISORS

By *Janine Hymas*
Deputy Clerk of the Board

COMMENTS RE DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT
SUBMITTED BY TRINITY COUNTY BOARD OF SUPERVISORS
COORDINATED OPERATION AGREEMENT
Central Valley Project/State Water Project

1. ALTERNATIVE 1 - The proposed action raises concerns over water temperatures in the Trinity River during critical water years. We share that concern and would not like to see any additional impacts occur to the depressed fishery of our river. Substantial state and federal funds are being spent to restore this lost fishery. This effort is having a positive effect recently and we would not like to add any additional burden to this recovery effort. The fact that this impact is likely to occur very infrequently is of some comfort as long as it does not occur during a period when anticipated fish production is already down. We would hope that use of CVP water for delta salinity control during these periods can be tempered with reasonable judgement regarding resource impacts when other alternatives are available for use.

We also have concerns for our lake recreational impact during periods of draw down. The added economic stress to our county, dependent to a large degree upon recreational enterprises, is difficult to bear. Visitor day use during these periods drop dramatically and take a long time for recovery. For example the loss of visitor day use, as a result of the 1977 drought period on Trinity Lake, has not yet risen to the 1975 level even though nine years have past. This has been cyclical impact is difficult for our fragile recreational businesses to tolerate. During these critical years draw down of the lake should be adjusted as much as possible to reduce this impact.

On page 90 - Trinity River Fish Flow.

We do not believe it is appropriate to use the original 120,500 acre-foot minimum in the operations plan for the period 2020 and beyond. The Secretarial Decision for 340,000 normal years, 220,000 dry years, and 140,000 in critically dry years which in a 12 year experimental period will surely never be allowed to go back to the, known to be irresponsible, level of 120,500 acre-foot. To even imply a reduction to that level is treacherous to us! The plan should use the existing instream flow levels and accept any adjustments that might occur later, "be they up or down", as a requirement for future amendment to the plan. We strongly urge that all reference to the original legislative authorization for a minimum of 120,500 acre-foot in all years be stricken from this document due to the terrible impact it has caused. Reference should be made to the Secretarial Decision which raised these flows. Even this level has not yet been determined to be adequate.

The mean unimpaired annual flow volume above Lewiston is 1.26 million acre-feet and the annual diversion from the project into the Sacramento averaged 1.14 million acre-feet prior to the recent Secretarial Decision. The impact of that diversion was the major cause of its dramatic decline of the anadromous fishery both at the hatchery and in the river below. Recent efforts by the Trinity River Task Force have shown significant improvement of the fishery population. Under the recently authorized PL 98-541 a 10 year restoration program to rebuild this lost fishery will demonstrate the importance of these increased flows. To build a long range plan that envisions a reduction to those terrible levels used prior to the Indrus Decision is reprehensible to us. We urge that the Coordinated Operations Agreement be amended to remove reference to the 2020 and beyond level of flow in the Trinity of 120,508 acre-feet and in its place substitute the Secretarial Decision of 1981 and its effect on the CVP yield for that period.

MILLSAP MILLSAP & THOMPSON
ATTORNEYS AT LAW
FIRST AND NORTH STREETS
WOODLAND, CALIFORNIA 95698
PHONE 926-8143

MILLER MILLSAP
ROBERT W. MILLSAP JR.
THOMAS THOMPSON JR.

MAILING ADDRESS
A. G. 028 207
WOODLAND, CALIFORNIA 95698

November 12, 1985

Mr. Bob Schroeder
Bureau of Reclamation
2800 Cottage Way
Sacramento, Calif. 95825

Re: EIS/EIR on COA

Dear Mr. Schroeder,

The following comments are made on behalf of the Yolo-Samora Water District which lies in Yolo County, California, and is part of the service area of the Tehama-Colusa canal. Yolo-Samora Water District comprises 21,808 acres and has a potential of serving approximately 24,508 acres. We have several chief concerns in regard to the EIS/EIR. First, we are concerned that the U.S. adhere to the provisions of the California Watershed Protection Statutes (WPS) (See attachment hereto). The EIS indicates a disregard for the WPS. Second, the proposed program for contracting with the State of California for the sale of interim water to the SWP users data for the water requirements of northern California which is far below their ultimate requirements. Third, we are concerned that the EIS accurately present the facts, which it does not always do.

California Watershed Protection Statutes

Under "Summary" you state that "the projects are not to be operated to meet predetermined yields, but rather to first meet the needs in the areas of origin, including the delta water quality standards . . .". That is a good statement and is in accordance with prevailing law and court decisions. Unfortunately, the proposed COA does not adhere to the law in that respect. Paragraph 10(b)(2)(ii) states that "the U.S. will impose deficiencies on water purchased by the state in a manner consistent with Exhibit E." Exhibit "E" provides under paragraph 1(b) as follows:

"In any year that the Contracting Officer determines

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there is a shortage in the quantity of water available to customers of the United States from the CVP, the Contracting Officer will apportion available water among the water users capable of receiving water from the same CVP facilities by reducing deliveries to all such water users by the same percentage, unless he is prohibited by existing contracts, CVP authorizations or he determines that some other method of apportionment is required to prevent undue hardship. In the event reduced deliveries are necessary, the water supplies for both municipal and industrial use, and agricultural use shall be reduced by the same percentage for each contractor."

All water users of the CVP, including the SWP under the proposed contract for interim water, will be cut back during a drought by the same percentage regardless of whether or not any such user or users are in a watershed of origin. A period of drought is not only a very critical time for users, but is the precise time when users in an area of origin would need most to rely on their priority of use under Section 11460-3 California Water Code. If this provision of the COA becomes law, it will constitute a declaration of intent on the part of Congress which will take precedence over California water law. Would it merely modify the California statutes, or completely nullify them? In any event it would result in litigation.

If anyone doubts what position the Bureau of Reclamation would take in this, one need only refer to their briefs and arguments in the case of South Delta Water Agency, et al. vs. U.S. now before the U.S. District Court, Eastern District of California. In that case the U.S. contends that they cannot be sued because they need not comply with California water law, specifically the watershed protection statutes. The 9th Circuit Court of Appeals in an extensive written opinion filed 7/26/85 held specifically that the Bureau of Reclamation was bound by the watershed protection statutes. Under the COA as proposed northern California users, including those in the delta, would lose that protection. There is utterly no justification for this. Paragraph 1(b) of Exhibit "E" should instead specifically provide that a clear distinction be drawn between watershed users and non-watershed users as two separate classes of users, and

preserve the priority in use for these is a watershed.

The proposal to contract for interim water for the SWP is a proper arrangement as long as there is a right to recall the water when needed in a watershed of origin. Paragraph 10(b)(2)(i), provides for this. There are, however, insufficient safeguards for the recall within a reasonable period of time. Sections 11460-3 of California Water Code are far more firm about such protection than is the proposed COA. There should be language prohibiting the construction of extensive facilities for the use of such water as those facilities must eventually be paid for, and that can only be done by sales of water. When the water is withdrawn the income stops. They then have something like squatter's rights! There should be clear guidelines for this rather than the vague and brief language devoted to it. If the proposed COA is enacted, it will be the entering wedge and the first bit of federal legislation (declaration of federal intent) to modify the county of origin and watershed protection statutes of the State of California. This is even more important when we consider the next point.

Water Use Data for the Tehama-Colusa Canal

The Technical Report of March, 1984 on "Determination of Annual Water Supplies for CVP and SWP", is simply inaccurate in regard to the Yolo-Samora Water District and the Tehama-Colusa canal in general. In Table 2 (page 7 of the Report) the Sacramento Canals Unit of the CVP provides for delivery by 2020 of only 430,200 acre-feet annually and indicates a 1980 demand of only 125,000 acre-feet.

The Tehama-Colusa canal was authorized and constructed to serve a large part of the Sacramento Valley in Tehama, Glenn, and Colusa counties. As a result of legislation in 12/80 this was extended to include Dunnigan Water District and Yolo-Samora Water District in Yolo counties. The Bureau of Reclamation had previously regarded these districts as being in the Tehama-Colusa service area, and then in 1977 obtained a legal opinion to the contrary. The legislation cured this and reinstated the existing Dunnigan Water District and Colusa Water District contracts for lands in Yolo County.

In 1958 the Bureau of Reclamation published its first

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LETTER 2

feasibility report for the Yolo-Samora Water District. The report proposed to distribute 40,000 acre-feet from the Sacramento River through a cross-canal from the Sacramento River. Subsequently (1963) the district was impounded by the Bureau of Reclamation and districts south of the Yolo-Samora Water District to abandon its plans and support legislation for the enlargement of the lower three reaches of the Tehama-Colusa canal such that water could be delivered to southern Yolo County and Solano County. The district acceded and the legislation was passed in 1967. The enlarged canal was completed in 1981 at a cost of about 150 million dollars.

The Bureau of Reclamation prepared a written report on their water marketing program for the Tehama-Colusa canal on October 27, 1977, a copy of which is attached hereto. Through Reach 8 (end of the canal) the Bureau of Reclamation contracted to sell 312,700 acre-feet annually, and recognized a potential additional demand of 261,900 acre-feet, or a total of 574,600 acre-feet. In addition, it estimated an additional 40,000 acre-feet for the Yolo-Samora Water District which is now a part of the service area. The current service area would then have a demand of 614,600 acre-feet annually. The proposed westside canal would call for an additional 108,000 acre-feet annually, bringing the total Tehama-Colusa canal demand to 722,600 acre-feet. This is in sharp contrast to the Technical Report figure of 430,200! In fact, the latter recognizes only 590 of the potential demand. The Technical Report in setting forth a 1980 demand of only 125,000 acre-feet, was misleading when, in fact, as long ago as 1977 there was 312,700 acre-feet under contract. If we added the additional water requested and needed by existing districts, the total demand would already be in excess of 430,200 acre-feet.

The feasibility report of 1958 for the Yolo-Samora Water District gave a total of 21,700 irrigable acres and a gross acreage of 26,869 acres, but this was for lands within or adjacent to the district that could and probably would be served by the Yolo-Samora Water District eventually. Presumably, this was the case with other feasibility reports. This method of computation of acreage and total water requirements was continued up until April, 1985. At that time a letter was sent out to water agencies advising

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LETTER 2

that they were making a new survey of water needs. Enclosed was a summary of tentative recomputations of ultimate needs. The letter, however, stated, "Please note that the contractual water requirement is based upon the need for water to all irrigable acreage currently included within the respective district's boundaries." The requests of Colusa County Water District and Dunnigan Water District were reduced to zero, and Yolo-Samora Water District to 15,740 acre-feet.

We have, with Bureau of Reclamation assistance, made a survey of all Bureau of Reclamation records and computations of our water requirements and find that we can easily justify over 50,000 acre-feet for our area using the Bureau of Reclamation's own data and criteria. This is probably true for all the other districts as well. Yolo Flood Control and Water Conservation District and Solano Irrigation District, to the south of Yolo-Samora Water District, have needs of perhaps 125,000 acre-feet or more, and are not even listed!

Our reason for mentioning this is that this is all part of an ongoing process of negotiating the sale of interim water to the SWP. This sale will be at the highest possible price as most of these users in the SWP will be municipal and industrial users. Our water requirements are being minimized in these reports and negotiations in order to sell as much water as possible elsewhere at a higher price.

An ironic development is that the Bureau of Reclamation has filed an application with the SWP to expand the place of use of CVP water covered by state permits. In northern California the place of use is being expanded to the 1000' level whereas the legislation for the CVP does not give clear authority for use above the valley floor! This is explained by the Bureau of Reclamation as doing the thing "once and for all" rather than going back for repeated petitions in the future. No such petition has been filed heretofore and thus it would seem that the problem of repeated applications is really nonexistent. On the other hand, using the area that a district can conveniently serve as a basis for contract negotiations, as the Bureau of Reclamation has heretofore done, makes a great deal of sense. They now no longer wish to do this.

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LETTER 2

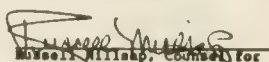
Inclusions are made from time to time in most districts. Our district would anticipate inclusion applications for about 4,900 acres once we go to contract. The Bureau of Reclamation recognized this in previous reports. It would be a serious detriment if a district had to amend its contract each time it had an inclusion. To take these inclusions into account during contract negotiations makes a great deal more sense than the expansion of place of use to the 1000' level!

We think that there needs to be a higher degree of consistency in the Bureau of Reclamation actions, and that the Bureau of Reclamation should stop juggling the figures.

In conclusion, we feel that a stronger and firm recognition of the California watershed protection laws should be incorporated into the COA so as to protect all watersheds. These watersheds also include the delta. As it is, the proposed COA subverts those statutes. We also believe that the Tehama-Colusa canal service area should be expanded to full capacity, including the remaining land in Yolo County and Solano County, and that their full needs not only be recognized, but recognized as a first priority in use.

In view of the cavalier approach already taken by the Bureau of Reclamation in the South Delta Watershed Agency case now pending, this bit of proposed legislation can only be regarded as brazen. The proposed COA would ultimately eliminate the priority in use of watersheds of origin, including that of the delta.

Very truly yours,


Russell Hillis, Counsel for
Yolo-Samora Water District

RM/gr

cc: Hon. Vic Fasio, M.C.
Hon. George Miller, M.C.
Hon. Eugene Chappie, M.C.
Tehama-Colusa Water Users Assn.
Central Valley Project Water Assn.
Westside Canal Assn.

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LETTER 2

California Watershed Protection Statutes

§11460. Deprivation of prior right to water to supply watershed area

In the construction and operation by the department of any project under the provisions of this part a watershed or area wherein water originates, or an area immediately adjacent thereto which can conveniently be supplied with water therefrom, shall not be deprived by the department directly or indirectly of the prior right to all of the water reasonably required to adequately supply the beneficial needs of the watershed, area, or any of the inhabitants or property owners therein.*

*Statutes of 1980, Ch. 632 attempted to amend this section but the amendment was rejected by the voters on a referendum vote.

§11463. Exchange of water between watersheds or areas

In the construction and operation by the department of any project under the provisions of this part, no exchange of the water of any watershed or area for the water of any other watershed or area may be made by the department unless the water requirements of the watershed or area in which the exchange is made are first and at all times met and satisfied to the extent that the requirements would have been met were the exchange not made, and no right to the use of water shall be gained or lost by reason of any such exchange.

§11128. Limitations: Application

The limitations prescribed in Section 11460 and 11463 shall also apply to any agency of the State or Federal Government which shall undertake the construction or operation of the project, or any unit thereof, including, besides those specifically described, additional units which are consistent with and which may be constructed, maintained, and operated as a part of the project and in furtherance of the single object contemplated by this part.

DATE		PROJECT	
10/27/77		Central Valley Project	
DATE		FEATURE	
		Tulare - Central Canal	
Water Measurement Program			

Canal Reach	Water Contracted (AF)	Actual Demand (AF)	Total Demand (AF)	Capacity % Requirement (AF)	Canal Capacity (AF)	Canal Adequacy (Inadequacy) (AF)
1	-	-	-	1.2	2300	1178
2	2,800	9,500	12,300	17.1	2300	278
3-7	247,700	252,450	500,150	17.9	2100	321
8	62,500	-	62,500	15.1	1700	1,176
Total	313,000	+ 261,950	= 574,950			
Yolo-Bypass		110,000 AF		11.3 AF		
Wash - San Canal		108,000 AF		3.7 AF		
				5.0 AF		

1) Assume peak demand in July of 22% for operations, 15.1% for maintenance, and 8.5% for 11.3.

THE BAY INSTITUTE OF SAN FRANCISCO

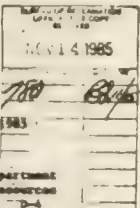
Board of Directors: Harrison C. Dunning, Dave Chan, Rogan A. Smeal, Paul C. Gave, Ruth Church Ogeps, Elan Shera Harris, Beverly Mills, William M. Eder, Philip A. Meyer, Will Ter, El Carrio

Bob Schroeder, Bureau of Reclamation, 2800 Cottage Way #-2137, Sacramento CA 95825

November 11, 1983

Karl Winkler, California Department of Water Resources, 3251 9 Street #D-4, Sacramento CA 95816

re: Draft EIS/R, COA, CVP/SMP



Gentlemen:

Enclosed please find my written comments on the above subject. These items, by page number wherever possible, my oral comments presented at the public hearing at Concord on the evening of November 7.

Two additional comments seem to be in order:

- a. The public notice provided for the hearing at Concord was deficient. To my knowledge I received no notice in the mail, despite participation by me in field hearings on the Draft COA during the past two years. (Also, I have been an active participant in State Water Resources Control Board hearings of all kinds affecting the two public projects, and am on the Bureau of Reclamation's mailing list for many CVP purposes.)

- b. Although my expectations of adequacy may be too great to be met by any government agency, I suggest that enclosed comments number 3, 4 and 7 are proper due to the (1) implied transfer of water from CVP service areas to SWP service areas, and (2) the suspension of the moratorium on CVP contracts if the COA is approved.

Please note enclosed Exhibit on the Striped Bass Index, attached to my formal comment.

Sincerely, William T. Deveran, Executive Director

William T. Deveran, Executive Director, 5080 Paradise Drive, Tiburon, California 94920, 415/435-9822, Calif. BAYINPEX

Comments on the Draft Environmental Impact Statement/Report

COORDINATED OPERATION AGREEMENT

Central Valley Project/State Water Project 1983

Submitted by

William T. Deveran, Executive Director, the Bay Institute of San Francisco

Summary: The most serious shortcomings of the EIS/R are:

- 1. The total disregard of the Striped Bass Index, and 45 years of "indicator species" government sponsored research and operations studies of CVP/SWP related impacts on fisheries.

Comment applies to: page 24-25; page 36, underlying assumptions; page 49, unexplained underestimation; pages 50-51, nonworking D 1483/Delta Plan standards based on SBI at "without projects" level of 79; page 50, no mention of toxics; page 57, CVP/SWP operations "one of many factors affecting fish..."; page 58, SBI failure negates all supposed benefits of Proposed Action; page 58, since 1483/Delta Plan based on "without project" levels of protection for striped bass, i.e. SBI of 79 units, conceptually the Action alternative should equate to D 1483/Delta Plan; page 68, consequences in CVP service area should include toxics subsurface drain wastes effects (increase/decrease) on striped bass survival.

- 2. Failure to describe fishery protection standards of D 1483, and other major threats of D 1483/Delta Plan, as based on "without project" levels of fish abundance.

Comment applies to: page 12, page 16, and all other descriptions of nature of State Water Resources Control Board's water rights (D 1483) and water quality (Water Quality Control Plan for the Delta and Suisun Marsh - "Delta Plan").

- 3. Omission of any history of the concomitant disappearance of 2 million acres of Central Valley wetlands with establishment of CVP and SWP.

Comment applies to: necessity to consider remedial alternatives of using CVP water now released, in effect, to SWP, for correcting misplaced and unplanned impacts of CVP on wetlands in service area, especially Sacramento River Valley.

Impacts of CVP generated subsurface return flows on private and public wetlands of San Joaquin Valley, a function of supplying CVP water to service areas.

Comments of W. T. Deveran on Draft EIS/R for COA page 2

- 4. Inadequate evaluation/discussion of San Luis Drain, including alternatives available if present search for technological solutions does not succeed.

Comment applies to: page 91, San Luis Gait description.

- 5. Use of inadequate and outdated economic information on value of various fisheries.

Comment applies to: page 49, salmon and striped bass annual dollar return estimates; page 70, salmon annual values, all species; steelhead counted annually at Red Bluff Diversion Dam, no dollar value provided.

A new source for dollar values on striped bass, salmon and steelhead fisheries is now available. It is:

The Economic Value of Striped Bass, Morone saxatilis, Chinook Salmon, Oncorhynchus tshawytscha, and Steelhead Trout, Salmo gairdneri, of the Sacramento and San Joaquin River Systems.

A report to the California Department of Fish and Game by Meyer Resources Inc., Davis CA. (Anderson Fisheries Branch Administrative Report No. 83-03, 1983)

- 6. No reference to or discussion of the D 1483/Delta Plan status as an officially approved federal-state water quality standards plan under Section 303 (c) of the Clean Water Act (33 USC 1364).

Comment applies to: any and all discussions of the nature, import, and operating mechanisms of D 1483/Delta Plan.

- 7. No listing or mention of endangered species in the CVP San Joaquin Valley service area, which will receive increased CVP supplies in dry and critical years.

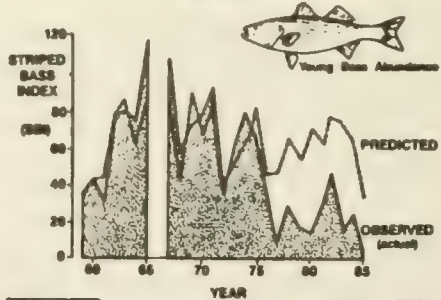
Comment applies to: Appendix B, Biological Assessment of the Impacts of the Coordinated Operation Agreement to Federally listed Threatened or Endangered Species.

Respectfully submitted, William T. Deveran, Executive Director, Bay Institute of San Francisco, 5080 Paradise Tiburon CA 94920

Handwritten signature and date: W. T. Deveran Nov. 14, 1983

Comments of W. T. Deveran on Draft EIS/R for COA of CVP/SWP EXHIBIT

STRIPED BASS INDEX BY YEAR



The Striped Bass Index (SBI) did correlate well with river flows, and water diversions of the large public projects (CVP, SWP), from 1959 to 1976. The failure gap shown above, for the years 1977-1983, has verified biologists and engineers since 1977. The lowest SBI since 1959 (6.3 units) was recorded in 1985. Despite fish protection controls in an approved federal-state plan (D 1483/Delta Plan) that calls for an annual SBI of 79 units, and despite many improvements the past decade in the quality of municipal and industrial waste discharges.

The SBI of 79 units is calculated to reflect what young-of-the-year striped bass abundance would be if neither the federal Central Valley Project or the State Water Project had ever been built. Compared to this "without project" standard, the federal-state fisheries experts estimate that the average abundance of young striped bass for the years 1932-1967 was 106 index units. All such data revolves around water project development practices of the past 40 years that are geared to each project providing "mitigation" and "enhancement" benefits to offset any deleterious impacts. As such it represents a bygone era of water management. (For example, the top of the SBI scale is 120 units) the remedial fisheries and water transfer project known as the Peripheral Canal, defeated by the California electorate in 1982, was projected to provide an annual SBI of 110. The object failure of the SBI since 1977 exposes the severe shortcomings of such single-species planning. Submitted by the Bay Institute of San Francisco.

Terry J. Gould, Consultant
California Trout, Inc.
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Donald Model
Secretary of Interior
Office of the Secretary
Department of Interior
Washington, D.C. 20340

Dear Secretary Model,

I served as consultant to the California State Senate Select Committee on Fish and Game Wildlife from 1978-81, and am presently consultant on water projects for California Trout, Inc., a major fisheries conservation group. Our organization believes that the Draft Environmental Impact Statement/Report, Coordinated Operation Agreement, Central Valley Project/State Water Project, July 1981, is deficient in hydrological, economic, and environmental analysis. The Agreement should not be authorized by Congress until these deficiencies are corrected and more satisfactory mitigation measures are adopted by the Bureau of Reclamation.

While the draft EIS presents analysis of the environmental effects of the Agreement during low water years, it does not analyze impacts during normal water years. The Agreement would reduce inflow to San Francisco Bay by about one million acre feet in normal years, once water purchase contracts are developed between CVP and SWP. Yet the impacts of this reduced flow on the bay ecosystem are not even mentioned in the draft EIS.

There is no analysis of the economic benefits of the Agreement to CVP and SWP. These great economic benefits must be weighed in determining the amount of mitigation. If CVP is able to sell 1 MAF annually to SWP and other parties as the result of the Agreement at a price of 150 per acre foot of yield, this amounts to 150 million in annual revenues to USBR. We believe these revenues should be used to fund mitigation for the existing project facilities impacts on fish and wildlife. Also, part of the water made available by the Agreement should be used for enhancement of instream flows on water rivers such as the San Joaquin and Stanislaus which have been adversely affected by USBR diversions.

We support the various recommendations of the U.S. Fish and Wildlife Service regarding mitigation. These recommendations primarily deal with flows and water temperature on the Sacramento River, minimum flows on the American River, and delivery of water to wildlife refuges. However, we disagree with their minimum flow recommendations for the American River: 1750 cfs October 15-December 31; 1250 cfs January 1-June 30; 800 cfs July 1-October 15, as measured at the mouth of the American River. While these flow levels may be appropriate for a critically dry year such as 1977, flow releases during moderately dry and normal water years should be considerably greater, especially during summer months.

We believe that minimum flows during moderately dry and normal years should be at least 2000 cfs all year. There is a great increase in stream depth and wetted perimeter at 2000 cfs flows when compared with a flow of 1500 cfs. Studies done by Don Kelly and Associates found that this 500 cfs incremental flow raised average stream depth by 8 inches in most stream sections, greatly increasing spawning and rearing habitat for salmon and steelhead.

be planted in Clear Creek to take advantage of the increased rearing area and to establish naturally reproducing populations.

The Agreement should also contain a commitment by USBR to construct new fish ladders or other modifications at Red Bluff diversion dam, on the Sacramento River. This dam, which diverts water into USBR's Tehama-Colusa Canal, has been highly destructive to salmon and steelhead populations. Because of inadequate fish ladders, it greatly reduces salmon and steelhead spawning migration above the dam into the best spawning area of the river.

This can be readily seen in DFG studies of salmon spawning populations. In 1972, DFG estimated that 108,065 adult chinook salmon spawned above the diversion dam and only 11,930 spawned downstream on the Sacramento River to near Tehama. In contrast, in 1980, 36,300 chinooks spawned above the diversion dam, while 18,000 spawned on the Sacramento downstream to Tehama. This data indicates that the diversion dam blocks perhaps 50 percent of the salmon run from utilizing the stream area above the diversion. This has probably been the major factor in the great reduction in Sacramento River salmon runs in recent years, as spawning and rearing habitat is much more marginal below Red Bluff diversion dam and water temperatures are considerably warmer. It has also decimated the steelhead run from a total of about 10,000 spawners in 1965 to very small levels at present.

USBR facilities on the upper Sacramento River must be modified because they have caused previously plentiful salmon and steelhead runs to become reduced to the point of their becoming endangered or threatened species. For instance, the historic race of steelhead which migrated into the upper Sacramento during late spring-early summer months is almost extinct. The runs during these months presently consist of only about 200 fish, many of which may be resident rainbow trout. No hatchery mitigation or other management activities have been used to preserve this important race of salmonids, which is extinct in other Sacramento River drainages. Hatchery propagation of these fish is necessary so that they may be reintroduced in streams throughout the Sacramento Valley.

Red Bluff diversion dam also is the principal cause of the radical reduction in late fall run, winter run, and spring run chinook salmon. In 1972, fall run chinook spawning upstream from the dam numbered 33,359 adults, late fall run fish numbered 31,019 adults, winter run fish numbered 25,929 adults, and spring run numbered 7,038 adults. In 1980, fall run chinook runs were 21,961 adults, late fall run were 9,281, winter run were 1,142, and spring runs were 9,283. While the proportions of these various runs tends to vary from year to year, it is clear that the late fall runs have greatly diminished, while the winter run fish are on the verge of extinction. Although the fall run chinook populations are enhanced by hatchery production at Colusa, the other runs are dependent upon natural reproduction. The late fall and winter run fish are highly important for management purposes as their life cycles are well suited to present flow release patterns. However, the inadequate ladders at Red Bluff diversion dam seem to be the major factor in destroying their populations, which even in recent years were about equal in numbers to the fall run.

The Agreement should also require USBR to release adequate flows for salmon, steelhead, and trout populations at its Priest Dam on the San Joaquin River. There are presently no agreed flow releases at Priest Dam, constructed in 1942, despite its watershed area of 1,673 square miles and annual flow at the dam which averaged 1.7 million acre feet in 1907-75, an average flow of 2,431 cfs. (USBR data) Inflow to Priest is very stable because of regulation by large reservoirs on its upper reaches. USBR presently diverts almost all flows, except during extreme flood stages, into the Priest-Kern and Modero canals, combined

American River flows average 2.7 million acre feet, an average flow of 3640 cfs. It is operationally feasible for the Bureau to achieve these 3000 cfs flows by a moderate change in operations at Folsom Lake, reducing stream flows in May-July and increasing flows during August-November. This year, which has been relatively dry, American River flows averaged about 3800 cfs in May-July, and were dropped to 1500 cfs in August-October.

As part of the Agreement, USBR should modify the present water intakes at Folsom Lake so that water releases may be made from deeper and cooler water strata during summer and fall months. Studies done by USBR find that water temperatures reach over 70 degrees F during summer, measured at 7th Ave., about 10 miles downstream from the dam. This is highly detrimental to salmon and steelhead populations, as these high water temperatures create stress and lowered growth rates in juveniles of these species. While steelhead spawn in the American, very few of their progeny survive to become adults because of the water temperatures. Salmon runs are also affected as smolts which remain in the river during summer do not survive well. High water temperatures favor neogamphid which compete with and predates upon young salmon and steelhead.

The Agreement should also commit the Bureau to provide greater funding for Colusa Hatchery, on Battle Creek, which mitigates for Shasta Dam on the Sacramento River, and Minner Hatchery, on the American River. Colusa Hatchery needs an investment of at least \$1.8 million to restore its production and a larger expenditure to increase the productivity of this obsolete facility. Minner Hatchery requires somewhat larger expenditures to fulfill the joint State-USBR expansion plan. I drafted legislation, enacted by the State Legislature in 1979, which provided \$300,000 for planning this expansion program.

The Agreement should include higher flows on the Trinity River, as recommended by the U.S. Fish and Wildlife Service, to restore its salmon and steelhead fisheries. USBR's Trinity Dam, capacity 2.3 million acre feet, has reduced Trinity River flows at the dam site from an average of 1.36 million acre feet in 1894-1971 to a present flow release of only 285,000 AF annually. (USBR data)

An average of one million AF is transported to Whiskeytown Reservoir on Clear Creek, in the Sacramento River basin. At present, almost all these flows are conveyed directly to Keswick powerhouse on the Sacramento River, rather than being allowed to flow instream on Clear Creek. Flow releases on Clear Creek at Whiskeytown area: some cfs June-September, with flows raised to 30 cfs in October, 100 cfs in November-December, 50 cfs in January-February, and 30 cfs in March-May.

We suggest that the 22 miles of Clear Creek below Whiskeytown could be one of the most important spawning and rearing tributaries of the Sacramento River with flow releases of about 300 cfs year around. USBR recognizes this and has raised flow releases during the salmon spawning period. Higher flows on a year around basis are necessary to allow Clear Creek to become a major steelhead rearing area. This proposed flow release of 300 cfs amounts to 429,000 AF, less than half of USBR exports from the Trinity basin. While this program would reduce hydropower benefits at Keswick, we doubt that it would be greatly detrimental.

Clear Creek has habitat potential for supporting large runs of chinook salmon and steelhead. Its salmon run, even with present low flows, numbered 1,013 adults in 1976. (DFG data) With increased flows, it would support much greater runs at a lower cost to USBR than hatchery production. Instream flow studies need to be conducted, as Clear Creek's channel may be large enough to contain even greater flows, creating an "artificial" spawning channel on a natural stream at no capital cost. Surplus salmon and steelhead fry from Colusa Hatchery could

capacity 4,000 cfs. These diversions take place even in winter months as the water is used for groundwater recharge from Fresno to Shafterfield.

This extreme diverting of the San Joaquin River is illegal under California law, being an "unreasonable use" prohibited by Article X, Section 2 of the State Constitution. Section 5977 of the Fish and Game Code requires the owner of any dam to release water sufficient to maintain fish populations at their historic level. Moreover, Section 2014 of the Fish and Game Code allows the state to sue for damages for any such destruction of fishery resources.

The extreme diverting of the San Joaquin River is the most flagrant example of USBR violation of state and federal law, and should be remedied as part of the Coordinated Operating Agreement. Increased flows on the San Joaquin are also needed to meet state and FIM water quality standards in the delta. Under present circumstances, about 75 percent of flows in the lower reaches of the San Joaquin are agricultural return water which exceeds water quality standards during summer and fall months. Any increase in flow on the San Joaquin could serve as a new source of water for the Grasslands area, which no longer can use water from the San Luis Drain. USBR could recover any increased San Joaquin River flows at its delta pumping plant, or sell this water to SWP or other agencies.

This San Joaquin River flow enhancement program should be highly profitable for USBR, as it involves taking of water presently sold at a very low price under existing contracts and selling this water to SWP or other parties at a much higher price. Assuming 200 cfs in new flow releases, this amounts to 150,000 AF firm yield. As this water is presently sold under contract for perhaps \$2 per acre foot, its present income to USBR is about \$700,000. If it were sold to SWP for only \$20 per acre foot, USBR revenues would increase to \$7 million annually for this water. This instream flow program would net USBR as much new firm yield as the construction of Auburn Reservoir, without having to pay \$1.4 billion for project construction. It could also be used as a source of supply for the Folsom-South area, which Auburn was designed to serve.

The San Joaquin River, in the 18 mile section below Priest Dam, supported chinook salmon populations ranging as large as 56,000 adults prior to dam construction. Its present salmon spawning population is zero, according to DFG data. Pre-project flows in normal years averaged 1,000 cfs in November, 2,000 cfs in February, 3,100 cfs in May, and 1,830 cfs in August. Even in dry years flows averaged 1,100 cfs in November, 450 cfs in February, 1,600 cfs in May, and 600 cfs in August at Priest. (Jones and Stokes, 1977 study) Average flows in 1907-36 at Priest was 2,320 cfs. In a moderately wet year, 1933-36, mean monthly flows were: October - 1,122 cfs; November - 1,018 cfs; December - 795 cfs; January - 905 cfs; Feb. - 3,182 cfs; March - 3,774 cfs; April - 4,974 cfs; May - 4,032 cfs; June - 4,509 cfs; July - 2,568 cfs; August - 1,558 cfs; September - 1,316 cfs. (USBR gage data for 1936)

We believe minimum flow releases should be in the vicinity of 900-1,000 cfs in order to fully restore the fishery to near historic levels. Hatchery construction would also be required, as Priest has blocked fish passage to more than 144 stream miles on its main stem and major forks.

It should be noted that our proposed stream flow enhancement program are germane to the issue of the draft EIS: the original draft EIS, "Environmental Statement on the Reauthorization of the CVP and the Coordinated Operating Agreement for CVP-SWP", issued in July 1980, covered the stream flow issue with the following release requirements: American River - 250 cfs January-Sept. 15, 300 cfs Sept. 16-Oct. 31; Sacramento River - flows ranging 2300-3900 cfs; Trinity River - flows ranging 150-200 cfs; Clear Creek - 50 cfs Jan.-October, 100 cfs Nov.-December; Stanislaus

River - 98,000 AP annual releases; San Joaquin River - 3 cfs measured at Gravelly Ford. (See Vol. II, P.83 of the 1980 [EIS] While these proposed flows are highly inadequate, the more recent SIS/EIR is highly deficient in ignoring the stream flow issue.

The new draft Agreement also needs to establish more adequate flows on the Stanislaus River, downstream from USBR's New Melones Reservoir, 3.4 million acre foot storage capacity. The Stanislaus has a drainage area of 296 square miles at New Melones and annual runoff averaging 1.2 million acre feet, an average flow of 1,716 cfs. In a moderately wet year, 1932-33, its mean flow at the old Melones powerhouse totaled 1,110,000 AF, with flows ranging: Oct. - 296 cfs; Nov. - 183 cfs; Dec. - 190 cfs; Feb. - 2,383 cfs; March - 2,373 cfs; April - 4,461 cfs; May - 3,103 cfs; June - 3,099 cfs; July - 1,195 cfs; August - 1,118 cfs; September - 791 cfs. (USGS gage data for 1932)

In contrast, flow releases below Goodwin Dam, which blocks salmon and steelhead migrations below New Melones, are highly capricious. Flows in 1975-80 were only 4 cfs during much of October, 14 cfs during most of June, and averaged only 36 cfs in August and 25 cfs in September. During most of the year, good water releases occurred as inflow to New Melones was 1,643,000 AF and water released at Goodwin Dam totaled 1,010,000 AF, with a mean flow of 1,392 cfs. (USGS 1980 data) Apparently the flow release problem lies in mismanagement rather than availability of water.

Present agreed flow releases from New Melones, as measured below Goodwin Dam, amount to 98,000 AF in normal years, with flows of 125 cfs January-May, 150 cfs June-September, and 200 cfs October-December. It should be noted that this flow agreement, signed in 1964, was violated for a total of 161 days in water year 1975-80. All these days of violations were extremely flagrant, with releases ranging 4-36 cfs when the flow agreement called for flows ranging 125-200 cfs. These violations were needless, as most daily flows in late December to mid-July were over 1,000 cfs.

The present flow release agreement is highly inadequate, and has a dry year provision allowing flows to be reduced to 30 cfs in June-September, 150 cfs October-Dec., and 100 cfs January-May. Given that annual inflow to New Melones averages 1,716 cfs and that this huge reservoir is capable of regulating all inflows, we believe that instream flow requirements below Goodwin Dam should be at least 300 cfs year around. These higher year around flows are particularly necessary to provide spawning and rearing habitat for steelhead, as well as increasing other recreation uses of this stream.

Pre-project chinook salmon runs, which were adversely affected by earlier dams and diversions such as Goodwin Dam and the old Melones Reservoir (115,000 AF), numbered 35,000 adults in 1957, with runs averaging 4,000 adults in 1951, 1957, and 1959. In contrast, in 1976-80 salmon runs ranged from zero fish in 1976 to 110 adults in 1979. (DFG data) Based on comparison with the American River, which has salmon runs averaging 30,000 adults and steelhead runs averaging 10,000 adults, the Stanislaus with good flow releases could support perhaps 25,000 salmon and 5,000 steelhead.

A more optimal flow regime on the Stanislaus should not be detrimental to USBR operations, as any additional water released could be recovered at the CVP and SWP pumps in the delta and sold for a higher price than could be obtained in the Stanislaus basin.

Our proposed flow regime on Clear Creek, American River, Stanislaus River, and San Joaquin River, together with the other mitigation measures proposed by

ourselves and the U.S. Fish and Wildlife Service, could potentially double runs of salmon and steelhead in Central Valley rivers. The Coordinated Operating Agreement offers the best opportunity for state and federal fish and wildlife agencies to achieve proper mitigation for existing CVP-SWP facilities. We believe these objectives can be attained without great cost to USBR operations, and should be the minimum price exacted for an agreement that would boost CVP-SWP yield by 1 million acre feet in several water years.

This opportunity should not be wasted.

Sincerely,

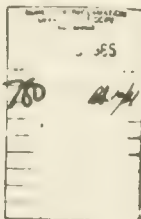
Terry D. Gould

Terry D. Gould, Consultant
California Trout, Inc.

- cc. Senator Alvin Cranston
- Rep. George Miller
- Rep. Vic Fazio
- David Kennedy, Director, California Dept. of Water Resources
- Jack Parnell, Director, California Dept. of Fish and Game
- Regional Director U.S. Bureau of Reclamation
- Jim Mc Levitt, U.S. Fish and Wildlife Service
- Lake Granger, Pacific Coast Federation of Fishermen's Organizations
- Rich Ray, President, California Trout, Inc.

CALIFORNIA WATERFOWL ASSOCIATION

1808 KEEPER COURT - SUITE 100 - SACRAMENTO, CA 95834 - (916) 441-0121 - (916) 442-1050



October 25, 1985

Mr. Robert Schroeder
U.S. Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, California 95825

Subject: Draft SIS/EIR on the COA

Dear Mr. Schroeder,

Your draft SIS/EIR has been reviewed and in general it is comprehensive and thorough. However, there are four areas in which it is seriously deficient:

1. The entire discussion of the COA's impacts and relationship to the Suisun Marsh are based upon the assumption that the four-party marsh agreement will be signed. While the current draft agreement is acceptable to the four parties, it cannot be implemented without Congressional action. There is no assurance that this will be forthcoming. As the result, in order to adequately address the Suisun Marsh issue, the SIS/EIR must evaluate the effects of the COA on the Marsh in the absence of the four-party agreement.
2. The section on pages 99-100, covering Mitigation Measures for Cumulative Impacts, is grossly inadequate. The construction and operation of the CVP has resulted in substantial wetland losses in the Project's service area. These impacts have never been mitigated, and the mitigation measures section on page 97 does not discuss the need to do so and alternative ways of accomplishing it.
3. The Removal of the Moratorium on New Water Service Contracts section on pages 97-98 has a serious deficiency. One of the more logical forms of mitigation would be the use of CVP water and power to provide the water supplies necessary to maintain the remaining wetlands in the CVP service area. Lifting the moratorium and sale of the remaining CVP yield without reserving the wetland water would effectively eliminate this approach to providing mitigation. This subject and its ramifications need to be thoroughly explored in the section dealing with the removal of the new water service contract moratorium.

4. The section on the removal of the moratorium contains the following statement:

"The terms of the moratorium provided that it would be lifted when the responsibilities of the CVP toward water quality protection in the Delta had been clarified and the Bureau had committed itself to meet these responsibilities."

While the statement itself is correct, it conveys a totally misleading impression that the signing of the COA would meet all the conditions established for lifting the moratorium. The additional conditions which have not yet been met include:

- A. Reauthorization of the CVP to make the use of CVP water and power for fish and wildlife project purposes.
- B. Preparation of legislation which provided a guaranteed water supply to National Wildlife Refuges in the Central Valley.

The SIS/EIR needs to point out that these conditions have not yet been met and discuss in detail the environmental consequences of failing to do so.

The Association appreciates the opportunity of providing these comments and hopes that they will be helpful to you in preparing the final SIS/EIR.

Very truly yours,

D. Chapin

D. Chapin, Chairman
Resources Committee

- cc: Karl Winkler, DWR
- Jim McLevitt, USFWS
- Pete Bontadelli, DFW
- Lee Lehman, CMA

Committee for Water Policy Consensus

Statement of
SUPERVISOR RUSSELL WRIGHT STEVEN
 CONTRA COSTA COUNTY
 and
CHAIR, COMMITTEE FOR WATER POLICY CONSENSUS
 on the
DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT
 for the
CVP/ISMP
COORDINATED OPERATION AGREEMENT

November 7, 1985
 Concord, California

We appreciate the opportunity to testify before you this evening.

The Committee for Water Policy Consensus (CWPC) is a broad-based and balanced group of diverse interests from the 12-county San Francisco Bay-Delta area, a region that is home to seven million people. This committee of public and private leaders includes elected officials, representatives from business, industry, labor, water agencies, environmental and public interest organizations, agricultural interests, the academic community, and individuals with water resources expertise.

The primary purpose of the CWPC when it organized in 1983 was to develop a water policy consensus that reflects economic efficiency and environmental protection.

The CWPC is strongly committed to securing protections for Northern California and the San Francisco Bay-Delta region before there is any increase in the level of exports out of the Delta. We see the federal-state Coordinated Operation Agreement (COA) as being a critically important Bay-Delta protection measure. We support both the COA and S.R. 3113, authorizing the Secretary of the Interior to sign the COA.

1485-G Enea Court, Suite 1353, Concord, California 94520 • (415) 682-6633

CWPC Testimony
 November 7, 1985

Page 2

We are extremely pleased that the federal government through the COA and S.R. 3113 now has made a commitment to providing its share of water quality protections for the San Francisco Bay-Delta estuarine system, in accordance with state-determined standards.

We are concerned, however, that the COA itself does not commit the federal government to meeting future water quality standards set by the State Water Resources Control Board (SWRCB); the COA only obligates the U.S. Bureau of Reclamation to meeting the current standards as contained in the SWRCB's Decision 1485. These standards are expected to change within a few years. Nevertheless, the COA assuredly represents a step in the right direction and we wish to commend the efforts of the federal and state negotiators in bringing about this historic agreement.

It must be noted that we do have some concerns about the draft EIS/EIR for the COA. Our major concern focuses on the assumption in the EIS/EIR that the Decision 1485 water quality standards provide adequate protections for the Bay-Delta estuarine system. It is clear to us that the Decision 1485 standards do not adequately protect the Bay-Delta estuary. The horrendous decline in the Striped Bass Index (SBI) is compelling evidence of this. The SWRCB set a goal in 1978 for a Striped Bass Index of 79; the Index has declined precipitously to 6.5, a level even lower than during the 1976-77 drought and, in fact, the lowest point in the history of the Index.

This situation is not acceptable and Decision 1485 must be modified to insure the health of the striped bass as well as other fish and wildlife in the estuary. Additionally, Decision 1485 does not include adequate standards for Suisun Marsh, San Francisco Bay, and the South Delta. These inadequacies should be noted in the EIS/EIR. It is wrong to say that by simply meeting Decision 1485 standards, the Bay-Delta estuary will be protected.

We also note that Decision 1485 was rejected by the Superior Court as improperly promulgated. If the EIS/EIR is to make the assumption that

CWPC Testimony
 November 7, 1985

Page 3

Decision 1485 adequately protects environmental values, then detailed information must be provided to document the validity of this assumption.

Additionally, the EIS/EIR should have more information on the effect on San Francisco Bay of diversions made by these two major water projects. Information on the effect on the estuary of return flow from agricultural wastewater drainage from the San Joaquin Valley also should be included.

The COA provides for approximately 900,000 acre-feet of water to be "made available" from the Central Valley Project after execution of the Agreement. The draft EIS/EIR discusses possible uses of this water, including sale to other contractors. The EIS/EIR should include an analysis of the benefits to the Bay-Delta estuary if this amount of water was used to improve water quality in the estuary — above Decision 1485 standards — by allowing the water to flow through and out of the Delta rather than being made available for export out of the Delta. We note that the economic damage due to losses in the striped bass, chinook salmon, and steelhead trout Central Valley fisheries amounts to \$117 million a year, with an additional loss of \$130 million in recreation benefits. These are losses that will be suffered annually as long as these three fisheries remain at their current depressed levels. (The source of this information is a report prepared by Meyer Resources for the California Department of Fish and Game.)

Another suggestion for the EIS/EIR is that an analysis of the various methods by which the COA can be terminated, either unilaterally or by both parties, should be provided. There appears to be several ways for the two parties to terminate the Agreement.

This concludes the committee's general comments on the draft EIS/EIR. In addition, we have a few specific comments, as follows:

1. Pages 34 through 36 discuss how operations of the two projects, in accordance with the COA, may result in an increase in temperatures

CWPC Testimony
 November 7, 1985

Page 4

downstream of Central Valley Project reservoirs which may be detrimental to salmon. In these pages, there lacks a statement that is later found on page 77 that "Coordinating operations of both projects to meet these standards is judged more beneficial to salmon overall than if these standards are not met". It would be useful to include this statement in the discussion on pages 34 through 36.

2. On page 42, there is a paragraph concerning Delta outflow to Suisun Bay, San Francisco Bay, and to the ocean, stating that tidal influences tend to overwhelm fresh water flows once they get beyond the Delta. This implies that Delta outflow are insignificant compared to tidal influences. There is no documentation to show that this conclusion is correct and it appears to be contradictory to recent findings concerning the necessity of flows to stratify various parts of San Francisco Bay. Fresh water flows are important to the health of the Bay.
3. On page 74, the statement is made "To the extent that any water saved by operating for the Tracy standards rather than for the Exhibit A (Decision 1485) standards would be released instead of retained in the reservoirs, the environmental consequences of No Action would approach those of the Proposed Action as far as rivers and reservoirs are concerned." This statement may be correct for rivers and reservoirs upstream of the Delta but is not true for the western Delta and the estuary system downstream of the western Delta which would be adversely affected by additional diversions from the Delta resulting from a relaxation of water quality standards.
4. On page 84, there is a short discussion concerning Friant Dam and Millerton Lake. Friant Dam is located on a stream tributary to the San Joaquin River. The San Joaquin River is one of the major tributaries to the Delta. An explanation should be made as to why water diversion facilities on the San Joaquin River (such as Friant Dam and New Release

Delta) are not governed by this Agreement and why they are not expected to contribute to Bay-Delta water quality.

In concluding our comments on the draft EIS/EIR, we note that we will monitor with interest the progress on the Coordinated Operation Agreement. We look forward to the Federal-state partnership in protection represented by the COA.

Thank you for this opportunity to share our concerns and suggestions with you.

Defenders OF WILDLIFE

November 9, 1985

Mr. Bob Schroeder
Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, CA 95825

Dear Mr. Schroeder:

Defenders of Wildlife submits this letter as our comments and recommendations on the Draft Environmental Impact Statement and Environmental Impact Report (DEIS/EIR) on the proposed Coordinated Operation Agreement of the federal Central Valley Project (CVP) and the California State Water Project (SWP). We request that this letter be included in the public record on this DEIS/EIR. This letter is also intended to supplement our verbal comments at the October 22, 1985, hearing in Sacramento.

At the outset, Defenders of Wildlife believes that the proposed Coordinated Operation Agreement (COA) is generally a positive step to achieve necessary protection for Delta water quality and associated natural values. We support this proposed COA (and H.R. 3113 pending in Congress) as far as it goes, but it does not go far enough. Despite our qualified support for this COA, however, we are disappointed with the gross inadequacies of the DEIS/EIR.

We firmly believe that this DEIS/EIR does not comply with the level of candid and comprehensive analysis required under the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) guidelines. Once the COA is executed, the Bureau of Reclamation (Bureau) intends to lift the present moratorium on entering additional long-term water service contracts for the CVP. This action will set in motion a number of significant adverse environmental impacts which have not received adequate consideration.

For example, the DEIS/EIR includes Appendix D with the "Biological Assessment of the Impacts of the Coordinated Operation Agreement to Federally Listed Threatened or Endangered Species." This appendix evaluates possible impacts on listed and candidate species which primarily occur in the Delta, Suisun wetlands, and along the Sacramento and American Rivers. Unfortunately, this evaluation completely omits consideration for other listed and candidate species which are likely to be

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adversely affected by additional water contracting and concomitant agricultural development. On pages 97-99 of the DEIS/EIR, it is conceded that removing the moratorium on new water service contracts could facilitate agricultural expansion in seven service areas. Some of these service areas, particularly those in the central and southern portions of the San Joaquin Valley, contain dwindling remnants of critical habitat for listed and candidate species. These species include the San Joaquin kit fox, bluntnosed leopard lizard, the Fresno, Tipton, and giant kangaroo rats, and many plant species. Further, some of the listed and candidate species which were evaluated in Appendix D occur in these regions, but adverse impacts from additional water contracts were not considered.

NEPA and CEQ guidelines require detailed consideration of cumulative impacts, and we understand that a recent federal court decision also mandates the evaluation of a "worst case scenario" alternative. We believe that this DEIS/EIR ignores these mandates.

It is clear, for example, that execution of the COA and removing the additional water contracting moratorium is a pivotal juncture with profound, long-term environmental implications, both for the Delta and throughout much of the Sacramento and San Joaquin Valleys. Indeed, much of the remaining endangered species, critical habitats, wetlands, and riparian vegetation could be jeopardized by both agricultural expansion and increased competition for limited water supplies. Deferring comprehensive analysis for at least seven water marketing service areas on a staggered and region-specific basis will not provide for an accurate assessment of cumulative and growth-inducing impacts. This DEIS/EIR sadly fails to address this need at this crucial decision point.

Another concern is the belated compliance with the Fish and Wildlife Coordination Act. We have reviewed a draft copy of the U.S. Fish and Wildlife Service's (FWS) Report and Recommendations under this law. We do not yet know if this Report and Recommendations has been officially transmitted to the Bureau. In any event, the draft Report and Recommendations contain many serious concerns which are not adequately addressed in the DEIS/EIR. We strongly recommend that the final EIS/EIR provide full and honest consideration of this Report and Recommendations.

For example, the draft Report states on page 3 that "for maintenance of wintering habitat in the Central Valley for Pacific Flyway waterfowl populations, it is essential that a firm supply of CVP water be provided to nine wildlife refuges and two wetland assessment areas administered under the National Wildlife Refuge System, and to three wildlife management areas administered by the California Department of Fish and Game." This compelling

concern relating to the health of millions of Pacific Flyway waterfowl and shorebirds, and the fate of wetlands on state and federal refuges, is not reconciled in the DEIS/EIR, despite the fact that additional water contracting would reduce the availability of CVP water which could otherwise be available for refuge purposes.

Defenders of Wildlife continues to be appalled at the failure of both the Interior Department and Congress to specifically resolve the perennial questions relating to CVP authorization for fish and wildlife purposes and the level of water and power which should be provided for refuges. In a Draft Interior Solicitor's Opinion of July 16, 1984, it is concluded that CVP water and power can legally be provided for fish and wildlife purposes, but it is unclear how this authority should be exercised. It is sadly ironic that while the Bureau is anxiously awaiting the opportunity to expedite execution of additional water service contracts for agricultural and other customers, there appears to be a stalemate in resolving the question of CVP water and power for fish and wildlife purposes. Of course, as these additional water contracts are executed, and the Bureau gradually reduces the current 1,000,000 acre feet of surplus CVP yield, the options and available water to address fish and wildlife needs will diminish. We believe that the COA and this NEPA evaluation provide the only meaningful opportunity to honestly address these concerns, and hopefully persuade the Interior Department and/or Congress to satisfactorily resolve them.

The DEIS/EIR lists a number of state and federal laws on page 99 which should provide environmental safeguards. We maintain that these laws, and the intent of both Congress and the California Legislature has been to require less damaging alternatives to proposed projects wherever possible, and to fully mitigate unavoidable adverse impacts. Execution of COA jeopardizes the future availability of water for federal and state wildlife refuges, and other wetland and riparian habitats. The DEIS/EIR does not address this problem, nor acknowledge the longstanding debate on CVP authorization for fish and wildlife purposes. We feel that the laws described on page 99 should be reconciled in this context to determine their applicability to maintaining reliable water supplies for state and federal wildlife refuges, as well as dwindling wetland and riparian habitats.

This analysis should especially include the Endangered Species Act, the Fish and Wildlife Coordination Act, the Migratory Bird Treaty Act, and compliance with the separate treaties with Mexico, Canada, Russia, and Japan.

Thank you very much for considering our views.

Sincerely,

Richard Spotts

Richard Spotts
California Representative
Defenders of Wildlife

RS/js

- cc: The Honorable Donald P. Hodel,
Secretary of the Interior
- The Honorable William P. Born,
Assistant Secretary for Fish and Wildlife and Parks
- David Houston, Regional Director,
Bureau of Reclamation
- David Kennedy, Director,
Department of Water Resources
- Karl Winkler, Department of Water Resources
- Senator Alan Cranston
- Senator Pats Wilson
- Congressman George Miller
- Congressman Vic Fazio
- Congressman Robert Matsui
- Congressman Richard Lehman
- Congressman Tony Coelho
- Interested parties

Since NEPA and the CEQ guidelines require the evaluation of a reasonable array of alternatives, we recommend that a "fish and wildlife protection" alternative be developed and analyzed. The brief and cursory examination of a similar "modified" alternative in the DEIS/EIR is patently inadequate. The alternative we envision would fully describe the legal and policy justifications for implementing the CVP authority to provide water and power for fish and wildlife purposes by, among other things, reserving at least a half-million acre-feet of CVP surplus yield for refuge and assessment areas. This alternative would comply with the environmental laws and treaties mentioned earlier, and assure maintenance of Pacific Flyway waterfowl and shorebird populations. Discussing this alternative in the NEPA format would also hopefully foster some tangible action by the Interior Department and/or Congress in arriving at a reasonable settlement.

The DEIS/EIR should evaluate the prospects of exacerbating the current agricultural drainwater and selenium problems to the extent that any additional water service contracts encourage expanded irrigation on areas with tainted soil. Similarly, it may be desirable to discuss the economic impacts of such agricultural expansion vis-a-vis surplus crops, farm price supports, and below-cost water pricing.

Finally, the San Luis National Wildlife Refuge may serve as an example of a problem which could eventually become a major wildlife tragedy, if not remedied. Due to a decision to stop using contaminated drain water to maintain some of this refuge's wetlands, alternative water sources were sought. At this writing, the refuge has reportedly not received replacement water, and, therefore, many former wetland habitats are now dry and unavailable to provide for the needs of hundreds of thousands of waterfowl and shorebirds which are arriving during this fall migratory season. This problem raises an ominous danger sign. The Interior Department and others have been severely criticized in the media and in Congress for failing to heed warning signs relating to selenium contamination in the nearby Kesterson National Wildlife Refuge. This highly-publicized problem was focused on wildlife deaths and deformities on about 1,200 acres of habitat. In contrast, we may experience the future de-watering of perhaps thousands of acres of refuge habitats, if the CVP concerns raised earlier are not promptly and adequately resolved. Please consider this letter as "notice" of this potential impending wildlife tragedy.

Defenders OF WILDLIFE

November 13, 1985

Mr. Bob Schroeder
Bureau of Reclamation
2800 Cottage Way, Room W-3137
Sacramento, CA 95825

Dear Mr. Schroeder:

Defenders of Wildlife submits this letter to correct two minor errors contained in our November 9, 1985 letter in response to the Draft Environmental Impact Statement and Environmental Impact Report (DEIS/EIR) on the proposed Coordinated Operation Agreement (COA).

On page-2, the word "renewing" should be replaced by the correct word "removing" on line number 3 (down from the top of the page). The overall purpose of that paragraph is to express our concern that removing the present moratorium on new water service contracting could facilitate agricultural expansion which, in turn, could jeopardize many listed and candidate species under the federal Endangered Species Act. Many of these species are also listed under California's endangered species law.

On page-2, line number 20, the word "environmental" is misspelled as "enviromal."

Please note these two corrections in the appropriate public record.

Thank you very much for your assistance.

Sincerely,
Richard Spotts
Richard Spotts
California Representative
Defenders of Wildlife

RS/db

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26
LAKE SHASTA CAVERNS

ADDRESS THE LAKE FROM OFFERING
80 HILLS DRIVE OF BUREAU OF RECLAMATION
TELEPHONE 916-433-5341
P. O. BOX 881, SACRAMENTO, CALIFORNIA 95833

October 9, 1985

Stamp: OCT 13 1985

Mr. Robert Schroeder
Bureau of Reclamation
2800 Cottage Way
Room W-2137
Sacramento, CA 95825

Dear Mr. Schroeder:

I have reviewed the draft EIS for the Coordinated Operation Agreement and have the following comments.

Lake Shasta by your own figures is the most popular recreation facility in the CVP system and yet it does not receive official recognition for its recreational benefits. As a result, the lake level is lowered during the peak tourist season while the other reservoirs are held to a more comfortable level for the tourists.

When the construction of Shasta Dam and completion recreation use are a direct consideration. Now that you are considering a modification in operating procedure to coordinate with the CVP, I believe that the whole matter of recognizing the recreational benefits of Lake Shasta be reconsidered.

Table 14 on Page 79 of the E.I.S. shows the effect of drawdown of the tourist trade. I have no way to confirm or deny the accuracy of the data. Our business in September of 1984 was about half of last years September business with a lake level down 120 feet at the end of August. This seems to be a reasonable extrapolation of your data. As a result of this year low water we will have to reduce our capital outlay program which means fewer jobs for an already depressed job market.

26
LAKE SHASTA CAVERNS

ADDRESS THE LAKE FROM OFFERING
80 HILLS DRIVE OF BUREAU OF RECLAMATION
TELEPHONE 916-433-5341
P. O. BOX 881, SACRAMENTO, CALIFORNIA 95833

Mr. Robert Schroeder
October 9, 1985
Page 2

to use of fairly small operations, but on an attract and hold tourists in the area. If all many of several operations on the lake which are in severe financial stress and are in danger of closing. Tourism to Lake Shasta has a significant effect on the economy of the entire county and should be considered in light of the magnitude of the problem.

Sincerely yours,

John C. Winter, President
Lake Shasta Caverns

27
National Audubon Society

133 AUDUBON PLACE, SACRAMENTO, CA 95825 (916) 451-3322



November 13, 1985

Mr. Robert Schroeder
U.S. Bureau of Reclamation
2800 Cottage Way, Room W-2137
Sacramento, CA 95825

Dear Mr. Schroeder:

The National Audubon Society appreciates this opportunity to comment on the Draft Environmental Impact Statement/Report for the Coordinated Operation of the Central Valley Project and the State Water Project.

GENERAL COMMENTS

We support the goal of coordinating operations of the Central Valley Project (CVP) and the State Water Project (SWP). These two water management systems are interrelated in terms of water supplies and the impacts they have created on California's environment. Competition and lack of coordination between the two projects have led to inefficiencies and management conflicts that are contrary to environmentally and economically sound water resource planning. The proposed action is a useful step in improving the management of our state's limited water supplies.

The proposed action in this analysis contains several attributes which would help protect the delta-hay industry. We support these provisions, particularly those which commit by the law the CVP to upholding delta water standards as determined by the State Water Resources Control Board.

We are very concerned, however, that the draft EIS/DIR does not speak with clarity and comprehensiveness to the fisheries impacts nor the likely impacts of providing an additional 1,000,000 acre-feet of water to the SWP and CVP service areas. We are particularly concerned that such deliveries could foreclose opportunities to secure a guaranteed water supply for the federal and state wetland areas in the Central Valley.

AMERICANS COMMITTED TO CONSERVATION

27
Mr. Robert Schroeder
November 13, 1985
Page 2

It is clear from our review that a major incentive for the project sponsors in coordinating operations would be the lifting of the 1976 Interior Department moratorium on new CVP water service. Its terms provide that once CVP responsibilities for maintaining delta water standards have been established, the moratorium would be lifted. This policy decision was accompanied by several other provisions pertaining to the operations of the CVP, some of which are referenced in the historical accounts leading up to the proposed action. For the record, these provisions, by then Secretary Cecil Andrus, included proposing legislation to:

- (1) authorize the CVP to meet state (delta) standards as approved by the Secretary on a non-reimbursable basis . . .
- (2) authorize the Secretary to relocate the Contra Costa Canal . . .
- (3) amend the CVP statutes to provide for fish and wildlife conservation . . .
- (4) authorize provision of a guaranteed water supply to Central Valley National Wildlife Refuge . . .

The policy decision to fence the coordinated operations proposal as only the first item is a departure from the kind of comprehensive water resource planning we need and is the source of our greatest concerns about the proposed action.

SPECIFIC COMMENTS

Page 8-3, Paragraph 3:

We disagree with the statement that the Agreement protects the interests of both projects while meeting water-related environmental responsibilities. The only such responsibilities adequately addressed pertain to Sacramento-San Joaquin delta. We believe the proposed action could benefit the delta but at the expense of upstream fishery values.

Page 8-4, Paragraph 2:

We believe the discussion of anadromous fish losses minimizes the threat to these beleaguered fish runs. The dynamic management of CVP facilities could well result in significant fluctuations in flows and water temperatures in upstream reaches of the Sacramento, American, and Trinity Rivers. Winter and spring run Chinook Salmon have already experienced significant declines under the present standards. Destabilizing temperature and flow regimes may well destroy these remnant populations.

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Copy to [unclear]

Mr. Robert Schroeder
November 13, 1985
Page 3

Page 8-7, Mitigation Discussion:

The standards proposed in the analysis could protect fish in the delta but at the expense of fish populations at spawning sites upstream. It is incorrect to state that protective standards contained in Exhibit A are sufficiently comprehensive to protect fish resources throughout the valley. Only through instream flow standards and temperature control programs can upstream fish resources be adequately protected.

We strongly believe that mitigation discussions should be expanded to include the addition of multiple-level intakes to outlet structures at Clair Engle and Shasta Dam to help control the anticipated temperature shifts of the proposed project.

Page 8-7, Cumulative Impacts:

We agree in principle that the proposed Agreement can be considered a link in a chain of events that could lead to other actions that could have significant environmental impacts. For this reason we believe the draft EIS must analyze and predict what some of the cumulative and long-term impacts could be.

If we accept for the sake of argument that 1,000,000 acre-feet of water can be made available from the CVP through coordinated operations and lifting of the Secretarial moratorium, the use of this water could have profound impacts on the natural landscape in California. For example, lands could be converted to agriculture that currently support federal and state listed threatened and endangered species. Land conversion through additional irrigation supply qualifies, in our view, as a secondary and indirect impact mandated by the National Environmental Policy Act. This kind of analysis has an important bearing on the overall evaluation of the project.

As previously stated, we also are deeply concerned that once the suggested 1,000,000 acre-feet is committed to the SMP and irrigators within the Central Valley, little if any guaranteed yield would be available to support wintering waterfowl areas on state and federal refuge lands within the affected area. These refuges are but a remnant of the wetland resources which existed prior to development of the CVP and the land conversion which followed.

Page 94

We are told that the proposed action provides added environmental protection on an overall basis and that if new project facilities are built they will have their own environmental documents. We believe it is inconsistent with sound resource management to postpone that kind of analysis to some later date on a project-by-project basis. This action is, in a very real sense, the foundation which makes such future projects possible. It is here that those broad issues of cumulative impacts should be addressed in a more coordinated manner.

Mr. Robert Schroeder
November 13, 1985
Page 4

In summary, we believe the draft EIS is seriously deficient in certain key areas. It should be withdrawn and amended to provide the public and decision-makers a resource for making intelligent decisions on this very significant proposal. Thank you for your consideration of our views.

Sincerely,

Dan Taylor
DANIEL TAYLOR
Regional Representative

DE/ol

- cc: The Honorable Alan Cranston
- The Honorable Pete Wilson
- The Honorable George Miller
- Earl Winkler, Department of Water Resources
- Jim McKeivitt, U.S.F.W.S.
- California Waterfowl Association
- Natural Resources Defense Council
- Defenders of Wildlife

Natural Resources Defense Council, Inc.

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Regional Environmental Offices
U.S. Bureau of Reclamation
2800 Cottage Way, Room W-1102
Sacramento, California 95825-1899

Dear Sir or Madam:

Enclosed are the comments of the Natural Resources Defense Council. As is discussed in the comments, we find that the Draft Environmental Impact Statement/Report has a number of deficiencies, which must be corrected if the final document is to comply with the National Environmental Policy Act.

Thank you for considering our views.

Very truly yours,

Laura B. King
Laura B. King
Senior Staff Scientist

Hamilton Candee
Hamilton Candee
Attorney

L&K/BC:htc

COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL
ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT
COORDINATED OPERATION AGREEMENT

Submitted By:

Laura B. King
Hamilton Candee

November 12, 1985

COMMENTS OF THE NATURAL RESOURCES DEFENSE COUNCIL
ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT
COORDINATED OPERATION AGREEMENT

I. Introduction

These comments on the Draft Environmental Impact Statement/Report (hereinafter "Draft EIS"), Coordinated Operation Agreement, are submitted on behalf of the Natural Resources Defense Council (NRDC). NRDC is a national, non-profit environmental organization with offices in New York, Washington, D.C., and San Francisco. NRDC has over 50,000 members and contributors nationwide, about 10,000 of whom reside in California. NRDC recently published a report on federal water pricing policies in the Central Valley Project, entitled Turning Off the Tap on Federal Water Subsidies, and is currently engaged in litigation over the handling of agricultural drainage water from the Central Valley Project at the Easterson Wildlife Refuge.

The proposed Coordinated Operation Agreement (COA) represents a major step forward in the battle to protect California's water quality, in that the federal government has agreed for the first time in the COA to meet state water quality standards for the San Francisco Bay Delta. As numerous reports have documented, water quality in the Bay Delta faces critical threats and is in dire need of protection. We are therefore pleased that the federal government has agreed to adhere to the state's water quality standards. However, we have several concerns about the COA and about the Draft EIS on the COA. First,

we are concerned that the execution of the COA will result in the signing of many new contracts for delivery of Central Valley Project (CVP) water, making that water unavailable for other environmentally beneficial purposes. Depending on the amount of water contracted by the Bureau of Reclamation, little if any water will remain available for wildlife refuges, where it is badly needed. The Draft EIS does not address this likely impact of the signing of the COA. Second, as the Draft EIS admits, some adverse environmental effects are likely to result from operation of the CVP in the manner needed to meet Delta water quality standards. However, the Draft EIS fails to propose mitigation measures which might alleviate such adverse impacts. Third, the Draft EIS does not address the deficiencies of the existing "Decision 1485" Delta water quality standards and fails to consider whether the COA should provide for federal cooperation should the existing state standards be modified. Unless these deficiencies are corrected in the Final EIS, we believe that the document will be fundamentally inadequate.

II. Impact of the COA on Water Availability for Fish and Wildlife Habitat

In 1978, Interior Secretary Andrus established a moratorium on the signing of new contracts for CVP water deliveries by the Bureau of Reclamation pending resolution of the COA. Once the COA has been executed, this moratorium is likely to be lifted, and the Bureau will be free to sign new contracts for water deliveries. As the Draft EIS states,

"After the proposed Agreement is executed, the Bureau intends to ask the Secretary of the Interior to lift the moratorium, thus allowing the Bureau to enter into negotiations for possible contracts for development of the uncommitted water supply of the CVP. This uncommitted supply is estimated at about one million acre-feet annually." (Draft EIS, p. 8-8)

While the Draft EIS thus admits that the moratorium on new contracts will be lifted after the COA is signed, it does not analyze the environmental consequences of this direct result of the COA.

That the signing of contracts for an additional one million acre-feet annually of water deliveries will have significant environmental consequences cannot be disputed. We are particularly concerned about the impacts that the signing of such contracts would have on wetlands habitat, both by virtue of precluding the provision of water to wetlands areas, and by virtue of encouraging further conversion of wetlands to agricultural development. Wetlands habitat in California is in critical need of fresh water supplies. The existing wetlands habitat is used by 60 percent of the Pacific flyway waterfowl population.¹ Of the originally five million acres of wetlands in California, there remain now only 450,000 acres.² The California Waterfowl

Association estimates that two-thirds of the marshes remaining in the Central Valley could be lost if water is not set aside for their preservation.³ The U.S. Fish and Wildlife Service has recommended that approximately 500,000 acre-feet, or an amount equal to half of the remaining uncommitted yield from the Central Valley Project, be made available for preservation of existing wetlands.⁴

The wetlands' need for fresh water has become even more acute in the last few years, as the crisis at Easterson has made clear that agricultural drainage water is frequently too toxic to use in wetlands areas and cannot be substituted for fresh water. The California Department of Fish and Game and the U.S. Fish and Wildlife Service recently joined in requesting from the Bureau 194,600 acre-feet of fresh water to help deal with the drainage water problem in the Grasslands area alone.⁵

The Draft EIS does not argue that the contracting of new water deliveries will not have significant environmental impacts. Rather, it avoids the necessary job of identifying those impacts by arguing that such impacts cannot be directly attributable to the COA:

¹Letter from Dan Chapin, California Waterfowl Association, to Senator James McClure, dated October 7, 1983.

²U.S. Fish and Wildlife Service, Proposed Fish and Wildlife Coordination Act Report on the Coordinated Operation Agreement, pp. 8-6 (September 23, 1986).

³Letter from Director, California Department of Fish and Game, and Richard J. Myshak, Regional Director, U.S. Fish and Wildlife Service, to David Houston, Regional Director, Bureau of Reclamation, dated May 24, 1983.

¹Hona B. Dennis and Mary Laurel Marcus, Status and Trends of California Wetlands, prepared for the California Assembly Resources Subcommittee on Status and Trends, p. viii (1984).

²Id., p. v.

"[T]he connection between the Coordinated Operation Agreement and any potential new contracts is tenuous. First, the Coordinated Operation Agreement is not a prerequisite to such contracts; new Central Valley Project contracts may be signed with or without the Coordinated Operating Agreement." (Draft EIS, p. 18)

This argument has a number of flaws. As we will demonstrate below, the signing of new contracts will be a directly attributable result of the COA, and the impacts of such contracts must therefore be considered in this EIS.

The Council on Environmental Quality's (CEQ) regulations implementing the National Environmental Policy Act (NEPA) explicitly require that an action's cumulative impacts and indirect effects be assessed in the environmental impact statement on that action. The signing of new contracts for water deliveries clearly represents both. The definition of environmental effect under the CEQ regulations includes cumulative impacts. 40 C.F.R. Sec. 1508.8(b). "Cumulative impact" is defined as

"the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." 40 C.F.R. Sec. 1508.7.

As the Draft EIS itself acknowledges, the Bureau is planning to request that the moratorium on new contracts be lifted and will seek contracts for deliveries of water up to one billion acre-feet per year. Obviously this is a foreseeable future action; NEPA therefore requires that its consequences be addressed in this EIS.

The CEQ regulations similarly require that an action's indirect effects be analyzed in an EIS. 40 C.F.R. Sec. 1508.8(b). Indirect effects are defined as effects

"which are caused by the action and are later in time or farther removed in distance, but are reasonably foreseeable." Id.

As we have noted earlier, the Draft EIS argues that such indirect or cumulative effects may be ignored in this EIS because the relationship between the COA and the signing of new contracts is "tenuous." In light of the fact that the Secretary established a moratorium precluding the signing of new contracts until the COA was executed, and in light of the statement in the EIS that the Bureau intends to seek the signing of new contracts after the COA is executed, the relationship appears to us to be very direct and not tenuous at all. While the Draft EIS states that new contracts may be signed without the COA (Draft EIS, p. 18), in fact the Bureau has not signed and will not sign long-term contracts until the COA has been executed. It is therefore necessary and appropriate to analyze the impacts of signing new contracts in the EIS on the COA.

In arguing that the connection between the COA and new contracts is tenuous, the EIS also implies that the division of water between the state and federal governments is irrelevant to the question of how much water is available for new contracts.

"Second, Exhibit B-3 is included in the agreement more to establish the positions of each party with respect to the rights of the other party than to indicate a physical presence of contractable water. Whatever water is physically available in the system is available regardless of the Agreement." (Draft EIS, p. 18)

This statement is misleading at best. Not only does the signing of the COA enable the Bureau to begin contracting for new water deliveries, but the allocation between the state and the federal governments has a direct effect on how much water the Bureau has available to contract with agricultural and municipal users and how much the Bureau may make available for wetlands. If, for example, the Bureau's share of responsibility when export water is available were 45 percent as opposed to the 55 percent under consideration, then the Bureau would have even less water to set aside for wetlands. If the Bureau's share increased to 65 percent, then the Bureau would have more water available to meet agricultural and municipal water demands as well as to supply fresh water to wetlands. Thus the establishment of shares itself determines the amount of water available to the Bureau to meet various water needs, including that of wetlands habitat, and the impacts of the allocation of state and federal shares on wetlands habitat must therefore be considered in this EIS.

The Draft EIS also argues that it need not consider the environmental effects of signing new contracts at this point because

"future actions beyond this Agreement would be necessary and would require environmental documentation and mitigation." (Draft EIS, page 8-7)

"[E]ach contract would be a separate and independent action subject to studies on water availability and environmental impact." (Draft EIS, p. 18)

While we agree that subsequent environmental documentation of the effects of signing individual contracts and regional effects of signing large numbers of contracts must be prepared, NEPA also

requires an agency to analyze the effects of such actions in sum before any of the individual actions are initiated. When, for example, the Department of the Interior attempted to establish an industrial water marketing program for the allocation of water supplies from a federal reservoir, the U.S. Court of Appeals ruled that the Department was required to prepare an EIS on the consequences of the program as a whole, and that preparation of an EIS on an individual contract was inadequate. As the decision pointed out,

"Courts have acknowledged and maintained a distinction between an EIS for an overall plan and an EIS for an individual lease, license or contract issued pursuant to the plan." *Environmental Defense Fund v. Andrus*, 13 ERC at 1378, 1377 (1979).

While the Draft EIS suggests that there is presently no plan for the signing of new contracts, it does note that the Bureau has "future commitments" to deliver approximately seven million acre-feet per year (Draft EIS, p. 66), or nearly one million acre-feet more than it is delivering at present, which indicates that the Bureau does have a plan and that the plan is to contract most of the remaining CVP water to municipal and agricultural users. As the Ninth Circuit has found, it is not necessary for all the specific details of a plan to be known in order to conduct an assessment of its environmental effects:

"That the exact type of development is not known is not an excuse for failing to file an impact statement at all. Uncertainty about the pace and direction of development merely suggests the need for exploring in the EIS/EIR alternative scenarios based on these external contingencies. Drafting an EIS/EIR necessarily involves some degree of forecasting." *City of Davis v. Coleman*, 521 F. 2d

461, 474 (9th Cir. 1978), quoted in Environmental Defense Fund v. Andrus, 13 EAC at 1374.

The Bureau has commenced preparation of an EIS on a program known as the Sacramento River System Water Marketing, which appears to be related to the question of new contracts to be signed after the COA is enacted. Based on our review of the Scoping Issues Report for this EIS, however, it will not fulfill the Bureau's obligations under NEPA because it looks at the effects of signing new contracts in only one part of the CVP. What is needed rather is a CVP-wide assessment of the impacts of signing many new contracts, an assessment which should be included in the EIS on the COA.

When Secretary Andrus issued his decision establishing the moratorium on the signing of new contracts in the Central Valley Project, he stipulated that the moratorium would not be lifted until the COA had been signed respecting state water standards, and committed the Department to taking several actions simultaneously with the signing of the COA in order to protect fish and wildlife. Among these were actions to give equal consideration to fish and wildlife purposes in the development and allocation of any new (post-1978) CVP water supplies. Secretarial Decision Document dated December 18, 1978. Clearly Secretary Andrus saw the signing of the COA, which was to free the Bureau to sign new contracts for water deliveries, as having an impact on fish and wildlife resources and therefore requiring additional actions on the part of the Department and the Bureau to mitigate those impacts. The EIS should consider these impacts and should

present an alternative in which protection of fish and Wildlife is given equal consideration to entering into new contracts for water deliveries.

III. The Lack of Mitigation Measures

As the Draft EIS admits, the execution of the COA will have some adverse environmental impacts, because the federal government's commitment to meet state water quality standards may mean that federal reservoirs will have to be drawn down further in dry years, which in turn will raise downstream river temperatures. As a result, fish breeding potential will be reduced. For example, the Draft EIS estimates that incremental mortality of Chinook salmon in the Sacramento River would increase during dry years by 2-20 percent at current operation levels, and by 13-70 percent at the operation level assumed in the year 2000, with the execution of the COA. Draft EIS, pp. 75, 76. The U.S. Fish and Wildlife Service is very concerned about the fishery impact of signing the COA, and stated in its draft report on the COA that "extirpation of the [winter-run salmon] race is not inconceivable" as a result of operations under the COA during dry years.⁶ Given the serious nature of these potential impacts, the EIS must discuss mitigation measures that would help alleviate the impacts. 40 C.F.R. Sec. 1502.14(f). The implementing regulations for NEPA give a specific definition for mitigation which includes:

⁶U.S. Fish and Wildlife Service, Proposed Fish and Wildlife Coordination Act Report on the Coordinated Operation Agreement, p. 3 (September 25, 1985).

- "(a) Avoiding the impact altogether by not taking a certain action or parts of an action.
- (b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- (c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- (d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- (e) Compensating for the impact by replacing or providing substitute resources or environments." 40 C.F.R. Sec. 1508.20.

The Draft EIS fails to propose, however, measures which would accomplish any of these purposes, suggesting instead that existing laws and regulations and future studies will provide adequate mitigation (Draft EIS, p. 89). This approach does not meet the requirements of NEPA.

IV. The Inadequacy of Present Bay Delta Water Quality Standards

While the COA would commit the federal government to providing enough water to meet the state Delta water quality standards, known as the "Decision 1485" standards, it is widely believed that these standards do not provide sufficient protection to the Delta, and the State Water Resources Control Board has announced its intention to re-examine the existing standards shortly and consider establishing new, more stringent standards. We consider the failure of the COA to make provision for adhering to stricter standards a major shortcoming of that agreement. The EIS on the COA must address this issue, either by considering an alternative action in which the COA would allow for compliance

with stricter standards or by assessing the consequences of the failure of the federal government to meet stricter standards should they be adopted. This analysis should address the question of the Bureau of Reclamation's ability to meet any new standards that might be established if it has already contracted away all the additional water that has been made available under the COA.

V. Conclusion

It must be recognized that the COA, while in some respects a step forward for the environment, also has potentially serious implications for the environment. Because the Draft EIS largely overlooks the potentially negative consequences of the COA, we believe that the Draft EIS does not meet the basic requirements of NEPA, and urge the Bureau and the Department of Water Resources to make the changes recommended above in the Final EIS.

sacramento river



preservation trust

Chico Office
788 Cherry Street
Chico, CA 95928
(916) 881-6428

Sacramento Office
908 Twelfth Street #207
Sacramento, CA 95822
(916) 448-8758

November 12, 1985

Bob Schroeder
Bureau of Reclamation
1500 Cottage Way, Room W-2137
Sacramento, Ca. 95825

Sari Sinkler
WR
1001 S St. Room D-4
Sacramento Ca. 95816

Re: dEIR/EIS for the coordinated operating agreement for the Central Valley Project and the California Water Project

Dear Sirs,

We appreciate this opportunity to comment on the COA. The Sacramento River Preservation Trust (the Trust) is a private non-profit organization concerned with conservation issues on the Sacramento River and in its watershed.

The Trust supports the development of the COA. Only with coordinated operation can California's Water projects provide the maximum benefit for California's diverse water needs.

Unfortunately the COA leaves open several avenues of destruction for the natural resources of the Sacramento Valley. The final EIR/EIS should address the following concerns and the COA should be modified appropriately.

Temperature effects in the Sacramento River and Chinook Salmon populations. The dEIR/EIS identifies the likelihood of lethally warm water during extremely dry years. The chinook salmon population is depressed far below historical levels, largely from the effects of the CVP and the CWP. Provisions should be made in the COA to mitigate against such heating effects.

Water supplies for Sacramento Valley Wildlife Refuges. The water needs of wildlife dependent on these refuges have been neglected in recent years. The COA should specify adequate minimum flows for the refuges and set a standard for future projects.

Additional assurances of water quality for the Bay and Delta. The COA should include assurances by both parties that they will abide by stricter water quality standards if these are determined necessary. The commitments to Bay and Delta water quality should be

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page 2
November 12, 1985

Sacramento River Preservation Trust comments on the dEIR/EIS for the COA

indefinite.

Finally the history of NEPA and CEQA indicate that an EIR/EIS should contain an analysis of an environmentally preferred option. This option maximizes environmental benefit. No such alternative is considered in the dEIR/EIS; one should be.

We would appreciate it if you could send copies of future mailings on this matter to each of our offices.

Sacramento River Preservation Trust
909 12th St. #207
Sacramento, Ca. 95814
and
Sacramento River Preservation Trust
708 Cherry St.
Chico, Ca. 95928

Thank You

Sincerely,

Jim Potter
Secretary of the Trust

CC: Interested Parties



United States Department of the Interior

BUREAU OF RECLAMATION
SAN FELIPE DIVISION CVP CONSTRUCTION OFFICE
P.O. BOX 47
GILROY CALIFORNIA 95021-0047
JAN 24 1986

Stamp: JUN 27 1986

IN REPLY
REFER TO
SFDC-221
500.-

To: Regional Director, Sacramento
Act: HP-780
From: Project Construction Engineer, Gilroy
Subject: Environmental Impact Statement/Environmental Impact Report
for the Coordinated Operation Agreement--San Felipe Division--
Central Valley Project

This is in response to your January 16, 1986 memorandum. We have the
following comments on the subject report:

- 1. The maps on page 3 and page 3 of Appendix D do not delineate
the San Felipe Project. (See enclosed map "Major Features of
the SWP and CVP")
2. On page 66, Table 9, the Maximum Entitlement for the San Felipe
Unit should be 216,000 acre-feet and not 196,300 acre-feet.
3. The map on page 67 needs to have the San Felipe Project service
area labeled. (See enclosed map)
4. On page 91, the second paragraph on the right beginning with
the second sentence; it should read "From the reservoir, the
Pacheco Tunnel will convey water to a series of conduits and
eventually to both counties. Existing facilities in the Santa
Clara area and the San Justo Reservoir will store and control
the water."
5. On page 7 of the agreement, San Justo Reservoir should be listed
with the facilities of the United States.

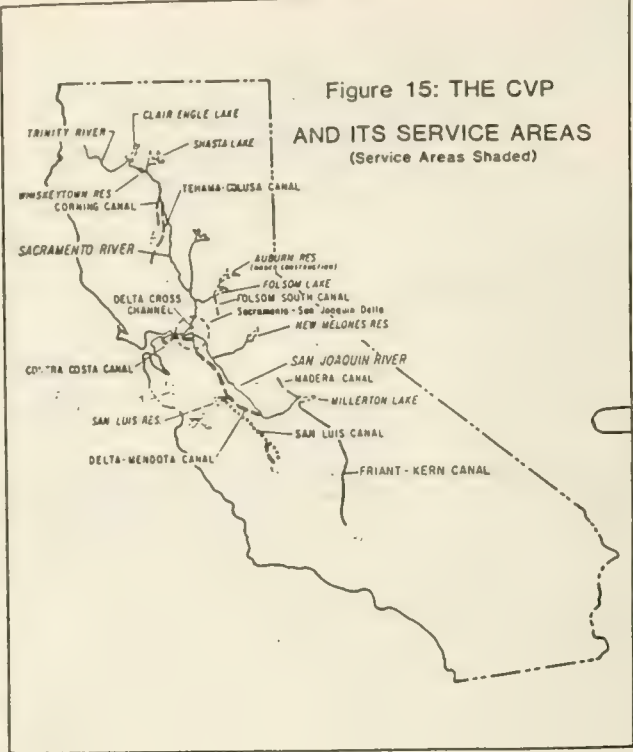
William C. Hart

Enclosures

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30

Figure 15: THE CVP
AND ITS SERVICE AREAS
(Service Areas Shaded)



67

31

SACRAMENTO VALLEY
WESTSIDE CANAL ASSOCIATION
ROUTE 1, BOX 1079M
WOODLAND, CALIFORNIA 95695

January 22, 1986

Mr. Bob Schroeder
Environmental Resources Dept.
Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

RE: EIS/EIR on COA

Dear Mr. Schroeder:

The following comments are made on behalf of the Sacramento Valley
Westside Canal Association. Our chief concerns in regard to the EIS/EIR
are as follows:

- 1. The U.S. should adhere strictly to the provisions of the California
Watershed Protection Statutes (WPS) (See attachment hereto). The EIS indicates a disregard for the WPS.
2. The proposed program for contracting with the State of California
for the sale of interim water to the SWP uses data for the water requirements
of northern California which are far below their ultimate requirements.
3. We are concerned that the EIS accurately present the facts, which
it does not always do.

California Watershed Protection Statutes

Under "Summary" you state that "the projects are not to be operated
to meet predetermined yields, but rather to first meet the needs in the
areas of origin, including the delta water quality standards...". That
is a good statement and is in accordance with prevailing law and court
decision. Unfortunately, the proposed COA does not adhere to the law in
that respect. Paragraph 10(h)(2)(11) states that "the U.S. will impose
deficiencies on water purchased by the state in a manner consistent with
Exhibit E." Exhibit "E" provides under paragraph 1(b) as follows:

"In any year that the Contracting Officer determines there is a shortage
in the quantity of water available to customers of the United States
from the CVP, the Contracting Officer will apportion available water
among the water users capable of receiving water from the same CVP
facilities by reducing deliveries to all such water users by the same
percentage, unless he is prohibited by existing contracts. CVP authorizations
or he determines that some other method of apportionment is required
to prevent undue hardship. In the event reduced deliveries are necessary,
the water supplies for both municipal and industrial use, and agricultural
use shall be reduced by the same percentage for each contractor."

31

January 22, 1986
Page 2

All water users of the CVP, including the SWP under the proposed contract
for interim water, will be cut back during a drought by the same percentage
regardless of whether or not any such user or users are in a watershed of
origin. A period of drought is not only a very critical time for users,
but is the precise time when users in an area of origin would need most
to rely on their priority of use under Sections 11460-3 California Water
Code. If this provision of the COA becomes law, it will constitute a declaration
of intent on the part of Congress which will take precedence over
California water law. Would it merely modify the California statutes, or
completely nullify them? In any event it would result in litigation.

Paragraph 1(b) of Exhibit "E" should instead specifically provide that
a clear distinction be drawn between watershed users and non-watershed users
as two separate classes of users, and preserve the priority in use for those
in a watershed.

The proposal to contract for interim water for the SWP is a proper
arrangement as long as there is a right to recall the water when needed
in a watershed of origin. Paragraph 10(h)(2)(11), provides for this. There
are, however, insufficient safeguards for the recall within a reasonable
period of time. Sections 11460-3 of California Water Code are far more
firm about such protection than is the proposed COA. There should be language
prohibiting the construction of extensive facilities for the use of such
water as those facilities must eventually be paid for, and that can only
be done by sales of water. When the water is withdrawn the income stops.
They then have something like squatter's rights! There should be clear
guidelines for this rather than the vague and brief language devoted to
it. If the proposed COA is enacted, it will be the entering wedge and
the first bit of federal legislation (declaration of federal intent) to modify
the county of origin and watershed protection statutes of the State of California.

The County Supervisors Association of California (CSAC) completed a
statewide water policy study. This written report was approved unanimously
on November 14, 1985 by the CSAC General Assembly. All areas of the State
were represented on the CSAC Task Force which prepared the report. A specific
section deals with areas of origin, watershed protection, and also makes
strong recommendations in regard to federal project authorizing legislation.
A copy of that section of the report is attached hereto. This is even more
important when we consider the next point.

Water Use Data for the Tehama-Colusa Canal

The Technical Report of March, 1984 on "Determination of Annual Water
Supplies for CVP and SWP", is simply inaccurate in regard to the Tehama-
Colusa canal in general. In Table 2 (page 7 of the Report) the Sacramento
Canals Unit of the CVP provides for delivery by 2020 of only 430,200 acre-
feet annually and indicates a 1980 demand of only 125,000 acre-feet.

The Bureau of Reclamation prepared a written report on their water marketing program for the Tehama-Colusa canal on October 27, 1977, a copy of which is attached hereto. Through Reach 8 (end of the canal) the Bureau of Reclamation contracted to sell 312,700 acre-feet annually, and recognized a potential additional demand of 261,900 acre-feet, or a total of 574,650 acre-feet. In addition, it estimated an additional 40,000 acre-feet for the Yolo Zamora Water District which is now a part of the service area. The current service area would then have a demand of 614,650 acre-feet annually. The proposed westside canal would call for an additional 108,000 acre-feet annually, bringing the total Tehama-Colusa canal demand to 722,650 acre-feet. This is in sharp contrast to the Technical Report figure of 430,200. In fact, the latter recognizes only 59% of the potential demand. The Technical Report insinuating forth a 1980 demand of only 125,000 acre-feet, was misleading when, in fact, as long ago as 1977 there was 312,700 acre-feet under contract. If we added the additional water requested and needed by existing districts, the total demand would already be in excess of 430,200 acre-feet.

This is part of an ongoing process of negotiating the sale of interim water to the SVP. This sale will be at the highest possible price as most of these users in the SVP will be municipal and industrial users. Our water requirements are apparently being minimized in these reports and negotiations in order to sell as much water as possible elsewhere at a higher price.

In conclusion, we feel that a stronger and firmer recognition of the California watershed protection laws should be incorporated into the COA so as to protect all watersheds. These watersheds also include the delta. As it is, the proposed COA subverts those statutes. We also believe that the Tehama-Colusa canal service area should be expanded to full capacity, including the remaining land in Yolo County and Solano County, and that their full needs not only be recognized, but recognized as a first priority in use for the CVP. If these things are not done, the proposed COA would ultimately eliminate the priority in use of watersheds of origin, including that of the delta.

We would appreciate hearing from you regarding these concerns.

Thank you for your consideration.

Sincerely yours,

Toyla J. Thompson
Toyia J. Thompson
President

TJ/TJC
enclosures

- cc: Hon. Vic Fazio, M.C.
- Hon. George Miller, M.C.
- Hon. Eugene Chappie, M.C.
- Tehama-Colusa Water Users Assn.
- Central Valley Project Water Assn.
- David Houston, Regional Director U.S.B.R.

California Watershed Protection Statutes

§11460. Deprivation of prior right to water to supply watershed area

In the construction and operation by the department of any project under the provisions of this part a watershed or area wherein water originates, or an area immediately adjacent thereto which can conveniently be supplied with water therefrom, shall not be deprived by the department directly or indirectly of the prior right to all of the water reasonably required to adequately supply the beneficial needs of the watershed, area, or any of the inhabitants or property owners therein.*

*Statutes of 1980, Ch. 632 attempted to amend this section but the amendment was rejected by the voters on a referendum vote.

§11463. Exchange of water between watersheds or areas

In the construction and operation by the department of any project under the provisions of this part, no exchange of the water of any watershed or area for the water of any other watershed or area may be made by the department unless the water requirements of the watershed or area in which the exchange is made are first and at all times met and satisfied to the extent that the requirements would have been met were the exchange not made, and no right to the use of water shall be gained or lost by reason of any such exchange.

§11128. Limitations: Application

The limitations prescribed in Section 11460 and 11463 shall also apply to any agency of the State or Federal Government which shall undertake the construction or operation of the project, or any unit thereof, including, besides those specifically described, additional units which are consistent with and which may be constructed, maintained, and operated as a part of the project and in furtherance of the single object contemplated by this part.

IV. AREAS OF ORIGIN

Satisfaction of water needs should be assured for all areas of origin. State law should provide that only surplus water may be exported from areas of point of origin. This principle must be applied to all beneficial uses, including instream needs, and must apply to all water supply sources, including groundwater. Counties support this protection so that all reasonable and beneficial needs are met. These protections should provide that only those waters surplus to the reasonable ultimate needs of the area of origin should be made available for beneficial uses in other areas. In addition, the cost of water development to users in areas of origin should not be increased by effecting a water export plan. In all state and federal project authorizing legislation, county of origin protections should be reaffirmed and the related feasibility studies should clearly identify and quantify all reasonable future needs of the counties of origin to permit the inclusion of specific guarantees in the authorizing legislation.

Counties of origin should be afforded financial assistance in developing new high cost water facilities to provide an equitable distribution of water costs to all users. Most of the lower cost facilities have been developed and are benefiting downstream users.

NO.	DATE	PROJECT	FEAT.
1	10/27/77	Central Valley Project	
2		Tehama-Colusa Canal	

STATE: Water Marketing Program

Canal Rank	Water Demanded (AF)	Potential Demand (AF)	Total Demand (AF)	Capacity % (1975)	Canal Capacity (AF)	Canal Adequacy (Index)
1	-	-	-	17.2	2200	172
2	2,500	9,500	12,000	27.3	2200	278
3-7	247,700	252,450	500,150	117.9	2100	321
8	62,500	-	62,500	284	1700	1476
Total	312,700	261,950	574,650			

Yolo-Zamora 108,000 AF 113 AF
West-Side Canal 108,000 AF 28 AF
Total 216 AF

1) Assumes peak demand on July of 24% for riparian areas, 13.5% for wildlife refuges, and 8.5% for cities.

COPY

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

--00--

PUBLIC HEARING RE:)
CONSENTS ON THE DRAFT ENVIRONMENTAL)
IMPACT STATEMENT AND REPORT (DEIS/EIR))
FOR THE PROPOSED COORDINATED OPERATION)
AGREEMENT (COA) BETWEEN THE U.S. BUREAU)
OF RECLAMATION'S CENTRAL VALLEY PROJECT)
AND THE CALIFORNIA STATE DEPARTMENT OF)
WATER RESOURCES'S STATE WATER PROJECT.)

--00--

SACRAMENTO INN, COMSTOCK ROOM
SACRAMENTO, CALIFORNIA

--00--

TUESDAY, OCTOBER 22, 1985
7:30 P.M.

--00--

Reported by: Sherry L. Lloyd
CSR No. 5807

CAPITOL REPORTERS
REPORTERS & GENERAL COURT REPORTERS
200 ALHAMBRA BLVD. SACRAMENTO, CA 95811
(916) 446-2757

HEARING PANEL

For the Department
of Water Resources:

James U. McDaniel
Lawrence A. Mullins
Charles R. Shoemaker

For the Department
of the Interior:

Bob Schroeder
James E. Turner
F. Phillip Sharpe

--00--

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I N D E X

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SACRAMENTO, CALIFORNIA, TUESDAY, OCTOBER 22, 1985, 7:30 P.M.

--00--

MR. MC DANIEL: Well, it is 7:30, and that's the time we announced the notice to beginning the meeting.

First, I'd like to introduce the people at the head table. I'm Jim McDaniel, Chief of the Central District, the Department of Water Resources. On my right, Bob Schroeder, Bureau of Reclamation; Jim Turner, from the Regional Solicitor's Office; Phil Sharpe, Regional Planning Officer for the Bureau of Reclamation. On my left, Chuck Shoemaker, an attorney with our legal staff, Department of Water Resources; and Larry Mullins, who is Chief of the Division of Operations.

Let's see. Do we have any representatives of elected officials in the audience?

I might announce, the meeting will be recorded. The proceedings will be summarized. Copies will be available if anyone so desires.

Now, the handout that you received when you arrived did probably a better job of outlining the purpose of this meeting than I can. The basic purpose is to get public opinion on the document that was prepared to indicate the environmental consequences of siting and implementing the Coordinated Operating Agreement.

The process that we followed on this, beginning in

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1 August of 1983, we had a series of public scoping meetings
2 throughout the state to gather public input and decide
3 actually what should be considered in preparing the
4 environmental documentation.

5 Following that, in 1984 and '85, there were numerous
6 public negotiating sessions on the agreement. Agreement was
7 reached on the contract, draft contract, May 28th, 1985.

8 We completed and distributed an Environmental Impact
9 Statement/Environmental Impact Report in September of this
10 year. We've allowed 60 days public review, a 60-day public
11 review period, and that period will be up November 13th. So
12 we will accept statements or comments until that date.

13 As I indicated, we will be holding a second meeting
14 in Concord on the 7th of November at the Contra Costa Water
15 Agency offices. 7:30 p.m.

16 Following that meeting and following the public
17 review period, we will be incorporating into the Final
18 EIS/EIR the comments that we receive. And following that,
19 the Notice of Determination will be filed by the
20 Department -- Notice of Determination will be filed by the
21 Department for the EIR and a Record of Decision will be file
22 with the Bureau to the EIS.

23 We would hope that the process would be completed by
24 about January of next year.

25 When you arrived and signed in, you were asked to

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1 indicate if you planned to make a statement. And so far, I
2 don't think we have -- oh, we got one. I intended to say
3 we'd call on you in the order of your arrival and your
4 indication that you would like to speak. But we have one
5 speaker, so that's fairly easy.

6 We would ask -- well, I don't even have to say that.
7 I was going to ask you to try to limit it to about ten
8 minutes. But if you do that, we will be out before the
9 ballgame's over.

10 If you have written statements you'd like to submit,
11 you can submit them and we will include them in the record.

12 Staff is available to answer questions if you have
13 questions during the comment period. However, I would say
14 that if the questions require a more in-depth evaluation
15 than we can handle here, we will respond to you in writing
16 following the meeting.

17 I'd like to start the meeting by asking Mr. Phil
18 Sharpe to make comments, some comments for the Bureau of
19 Reclamation. Phil?

20 MR. SHARPE: The Bureau of Reclamation, the
21 Department of Interior and the Administration supports some
22 legislation on the COA. We are optimistic that we will get
23 a bill in the near future. Congressman Miller's Bill 3113
24 has passed the House. The Senate is now scheduling a
25 meeting on that bill.

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1 We have been working as joint partners, the Bureau of
2 Reclamation and the State, for sometime on negotiating this
3 agreement and in developing this environmental document.

4 As Jim mentioned, we are looking to get some comments
5 on the environmental document itself, without necessarily
6 looking for comments on the administrative bills or the
7 congressional bills or on the COA itself. But we are
8 seriously looking for your comments on the environmental
9 document. And we intend to try and be as responsive to
10 those comments as possible.

11 MR. MC DANIEL: Now Chuck Shoemaker will make a brief
12 statement for the Department of Water Resources.

13 MR. SHOEMAKER: I think it might be helpful to give
14 people a little bit of history and to point out the process
15 that was utilized in arriving at the Draft Coordinated
16 Operating Agreement itself.

17 This agreement has its genesis in an agreement that
18 was executed on May 16th, 1960. That agreement was very
19 important because it resolved at that time disputes that the
20 State and Federal Government had over the Water Rights
21 Application that had been filed for both projects, and it
22 was a general way to handle a sharing of shortages, as it
23 were.

24 But that agreement, it also cleared the way for
25 approval of the San Luis Act for the construction of the San

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1 Luis Reservoir. And what was an unprecedented feature that
2 grew out of that, the joint ownership of that facility,
3 which includes the San Luis Reservoir and a stretch of the
4 California Aqueduct that is used to carry both Federal and
5 Bureau water and out of which we serve Federal customers,
6 and the Department of Water Resources operates that stretch.

7 Now, that 1960 agreement called for a more specific
8 operating agreement. Back in 1960, we had yet to finish
9 construction of a great many of these facilities.
10 Negotiations started in early '61, continued through '71, or
11 into '71. There was another agreement then. That agreement
12 was not finalized, but it did form the basis for annual
13 letter agreements that were used by the operators of the
14 projects.

15 We then resumed negotiations in the late seventies
16 and have arrived at the present draft.

17 I think it's indicative of the fact that we don't
18 have a few thousand people here wondering what's going on,
19 the process that was used in the last four or six years on
20 the agreement, and that was all of the negotiating sessions
21 were noticed and open to the public. And many of the
22 sessions we had had more people in attendance watching us
23 sit across the table, the Bureau and the Department people,
24 as we went point by point through arriving at this
25 agreement.

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1 You may have noticed that in the EIR/EIS, it's -- at
2 least I can appreciate the fact, it was difficult for the
3 staff that had to prepare this to deal with. Because it's
4 on an agreement and not on some kind of tangible project
5 that you can have alternatives to, that you can readily
6 identify.

7 It's taken us roughly 25 years to come to an
8 agreement. And it wasn't in the cards for the negotiators
9 to negotiate out finally three or four alternative
10 agreements to be selected, quite frankly. It's just the
11 nature of any agreement where you are taking positions and
12 compromising and narrowing down to where you finally have
13 resolved all of your issues.

14 There is a major point involved in this Coordinated
15 Operating Agreement that I want to wind up on. And that is,
16 it is designed so that both projects are operated to meet
17 water quality conditions in the Delta, certain standards,
18 and also the in-beam needs in the areas upstream of the
19 Delta and in the Sacramento Valley.

20 And the projects are operated to meet those first.
21 It's not operated to meet some predetermined yield of the
22 project. We meet those needs in the area of origin and the
23 Delta water quality standard, including the flow
24 requirements, certain outflow requirements that are
25 necessary. Those are all contained in Exhibit A of the

1 Coordinated Operation Agreement.

2 Only then are the projects able to export water from
3 the Delta. And the agreement, by its terms, is not intended
4 to affect the rights of any third parties. It's an
5 agreement between the Department of Water Resources of the
6 State of California and the Bureau of Reclamation.

7 With that, I guess, by way of background, that's all
8 I would have to say.

9 MR. MC DANIEL: Thanks, Chuck.

10 I guess with that point, now I would ask for
11 comments. The one name that I have is Mr. Richard Spotts.

12 Mr. Spotts, would you please identify yourself and
13 whom you represent for the reporter, please?

14 MR. SPOTTS: Yes. I'm Richard Spotts, S-P-O-T-T-S,
15 California Representative for the Defenders of Wildlife.

16 And by way of background, Defenders of Wildlife is a
17 national nonprofit membership organization headquartered in
18 Washington D.C. I represent approximately 12,000 of our
19 California members.

20 While Defenders of Wildlife supports the CDA proposal
21 generally, as far as it goes, we feel that it does not go
22 nearly far enough.

23 The CDA proposal is flawed because it does not
24 provide for the resolution of finding secure reliable water
25 sources for Federal and State wildlife refuges throughout

1 the Sacramento and Central Valleys, the easement wetland
2 areas, and to ensure the perpetuation of other wetland and
3 riparian habitats throughout the Central Valley of
4 California.

5 In, I believe it was, 1954, there was strong legal
6 authority that the CVP authorizing legislation was amended
7 to expressly authorize fish and wildlife protection as
8 purposes of the Central Valley Project. We understand that
9 there is a 1954 Solicitor's opinion by the Interior
10 Department, which is still extant, that underscores that
11 commitment.

12 And there has also been an evolution in Federal and
13 State wildlife law, and we argue that there is a very firm
14 mitigation responsibility, among other things, under the
15 National Environmental Policy Act, the Endangered Species
16 Act, the Fish and Wildlife Coordination Act at the Federal
17 level, and at least under California's Endangered Species
18 Laws and the Water Coast Davis-Dolwig Act applicable to the
19 Department of Water Resources.

20 Clearly, both the Central Valley Project and the
21 State Water Project have contributed to the loss of
22 substantial wetland and riparian habitats throughout the
23 Sacramento and Central Valleys of California. There has not
24 been an adequate resolution to provide for the mitigation of
25 those past losses, nor to resolve mitigation for losses

1 which may occur in the future.

2 In fact, there is a new wrinkle that has arisen in
3 the last couple of years. And that is that, given the CVP
4 and State Water Project of irrigation in certain lands of
5 the western San Joaquin Valley, we now have a selenium
6 problem. And earlier this year, both the Interior
7 Department and State of California announced that wildlife
8 areas would no longer receive some contaminated water
9 supplies. Thus far, this has especially affected the San
10 Luis National Wildlife Refuge, the Restoration National
11 Wildlife Refuge, and we understand that some flows may be
12 diminished in the Grasslands Water District, which has a
13 number of Federal easements for waterfowl purposes.

14 There is concern that, in effect, the CVP and the
15 State Water Project have an obligation to provide better
16 quality water to offset the loss of water that was otherwise
17 available to these wildlife areas.

18 We firmly believe that the CDA should be broadened to
19 require satisfactory resolution of these fish and wildlife
20 issues prior to any further contracting of water for
21 agriculture, municipal or industrial uses. Indeed, we
22 believe it would be patently illegal for the Bureau or the
23 State to attempt to proceed to have further contract of
24 remaining surplus until these issues are resolved.

25 We believe that the Draft Environmental Impact

1 Statement and Report is inadequate because it fails to
2 adequately consider either, for lack of a better term, what
3 we would construe as an "optimum fish and wildlife
4 alternative" or a "worst case scenario alternative."

5 I'll describe the optimum scenario, if I may.

6 Actually, I'd like to just provide some background on the
7 National Environmental Policy Act in particular that's
8 applicable to the Federal Bureau of Reclamation. And we
9 have the California Environmental Quality Act as an analog
10 under state law.

11 Both laws set a fundamental policy that the public is
12 to have a full description of any projects that may
13 significantly affect the environment, and also that a
14 reasonable array of alternatives be presented to give the
15 public the opportunity to see different choices.

16 We find that this Draft Environmental Impact
17 Statement and Report does not facilitate those purposes,
18 again, through the absence of either sort of a best case or,
19 conversely, a worst case alternative.

20 An optimal alternative would set forth the needs of
21 State and Federal refuges for reliable water sources,
22 establish in-stream flow recommendations for the American,
23 Sacramento and Trinity Rivers, and otherwise meet a number
24 of the concerns that I outlined a moment ago.

25 On the other hand, the worst case scenario should

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1 describe what would occur with the absence of those
2 benefits. The failure to implement CVP and State Water
3 Project fish and wildlife purposes and mitigation
4 obligations and providing inadequate water for refuges,
5 wetland riparian habitats, and to reconcile the possible
6 expansion of agricultural lands through the contracting of
7 remaining yields in those projects and through arrangements
8 that may be executed.

9 Finally, to what degree does existing and prospective
10 water contracting exacerbate the problems with selenium and
11 salt problems in drain water in the Central Valley? And
12 again, we believe that, in essence, the draft document that
13 we're looking at tonight does not give an adequate
14 description of either of those alternatives, and we feel
15 that CEQA and a number of other laws require that candid
16 appraisal.

17 We understand that legislation was recently
18 introduced in Congress to authorize the Mid-Valley Canal in
19 the Central Valley. It's fascinating that we are sort of a
20 long way into this COA authorizing legislation process, and
21 in Congress now we have a bill in the hopper to authorize
22 yet another water transfer facility in the Central Valley;
23 and yet we haven't resolved many of the fundamental
24 questions about fish and wildlife protection vis-a-vis these
25 water projects. Indeed, we don't even seem to recognize the

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1 1954 Solicitor's opinion that arguably said that the CVP had
2 to authorize sufficient wildlife protection.

3 In addition, if the Mid-Valley Canal is constructed
4 and if this COA agreement helps to facilitate some water
5 through that facility, perhaps some new lands will be
6 converted for intensive agricultural purposes. If this
7 occurs, this conversion of land could adversely affect some
8 Federal and State listed endangered species, such as the
9 blunt-nosed leopard lizard, the Fresno kangaroo rat, the
10 Swaine's hawk, in addition to a number of candidate species
11 such as the tri-colored blackbird.

12 There are a number of charts that indicate the amount
13 of water that may be necessary to provide reliable water
14 sources for Federal and State refuges and the easment
15 areas. These estimates are approximately 500,000 acre-feet.
16 We understand that the CVP currently has a surplus of
17 approximately 900,000 to a million acre-feet. Thus, for
18 approximately half of the surplus yield remaining in the CVP
19 now, we may have the opportunity to resolve many of these
20 concerns without exceeding the current surplus.

21 And on a concluding note, I'd like to point out that
22 there is an urgent crisis right now as far as the absence of
23 good quality water for State and Federal refuges. I just
24 talked to the refuge manager of the San Luis National
25 Wildlife Refuge a few days back, and they still have not

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1 been able to provide any alternate water to flood up a
2 number of ponds that normally would be providing waterfowl
3 habitats right now, but which are dry. And there is concern
4 that, since they can no longer use the salt slough water,
5 which had been their legal source of water, that they are
6 having difficulty finding a timely replacement of water.

7 So it's sort of ironic that the public was
8 understandably concerned about all the waterfowl the last
9 couple of springs of the Easterson and those selenium-laden
10 ponds, and yet we now have the absence of a larger amount of
11 habitat that should provide for waterfowl. With additional
12 crowding of those birds, there will be less food available
13 for those birds. There is also the prospect for increased
14 waterfowl diseases, botulism and cholera in particular, as
15 the birds are concentrated in smaller areas.

16 So we hope that the Department of Interior and the
17 State of California will give a similar amount of concern to
18 providing that replacement water just as they address the
19 Easterson crisis.

20 Thank you very much.

21 MR. MC DANIEL: Thank you, Mr. Spotts.

22 That's the one card, the one signup that I have. Is
23 there anyone else that would care to make a statement?

24 Well, I hate to leave so soon. It is early.

25 MR. SCHURCHER: I'll just make a short statement.

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1 My name is Gerald Schumacher, Secretary/Manager of
2 the Kings County Water District. I did not plan to make a
3 statement tonight.

4 But I think what has developed over these years has
5 been a very progressive and cooperative type of system to
6 work out problems that did -- I mean, the problems existed,
7 but the mechanics, cooperation between the Federal
8 Government and the State, did not exist to get this
9 permanent agreement. And now we seem to have arrived at
10 this somewhat conclusion.

11 Personally, I would be very much in favor of seeing
12 this Coordinated Operation Agreement adopted. Of course,
13 I'm also from the San Joaquin Valley. I don't think the
14 area that I live in and the Rio-Valley, which was mentioned,
15 Rio-Valley Canal, the agencies there, for example, the
16 district which I am a part of, have worked for over 30 years
17 trying to work out contracts and additional water to take
18 care of our depletion.

19 The act in Congress -- although this is not the
20 reason for this meeting tonight, let's talk about that -- is
21 not something new that came on the board. It's something
22 that's been worked at for many, many years. And we hope
23 sometime in our total operation of water management that
24 that will become a reality.

25 From the previous testimony, I also agree that there

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1 are problems that have to be solved. But I think this thing
2 that I wanted to make a point on, that the COA as we now
3 have it is a major step to perhaps relieve the solution to
4 all those problems that may come up from time to time.

5 That's all I'd like to say. But I would sure be in
6 favor of seeing adoption of your present agreement.

7 MR. MC DANIEL: Thank you. I notice we have two late
8 arrivals. Would either of you care to make a statement?

9 Is there anyone else that would care to make a
10 statement?

11 Why don't we spend a few minutes then and perhaps we
12 can answer any questions that you might have. Are there any
13 questions from the audience?

14 MR. SPOTTS: One thing that I was curious about, in
15 the document, there's the contingency that in those
16 critically dry years it may be hard to maintain water
17 temperature levels that are necessary for adequate
18 fisheries.

19 One thing I didn't see mentioned to a great detail is
20 multiple intakes. I'm not a hydrologist, but I guess the
21 Shasta and Folsom Dams, they might be modified in that way.
22 And if that worst case contingency occurred, that you could
23 draw, I guess, from the deep water that is cooler, and even
24 though you had reduced flow in the river, you still might be
25 able to keep the temperature lower and maintain more fish.

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1 MR. MC DANIEL: Bob, could you respond?

2 MR. SCHEIDT: Yes. The Bureau and other agencies
3 have been studying that problem for a number of years now.
4 And right now, the indications are that costs far outweigh
5 the benefit that it might give to the fisheries in the
6 Sacramento River.

7 The way Shasta Dam was built, it isn't very conducive
8 to getting down to the lower depths where the colder water
9 is. And really, it would only make a difference -- putting
10 a multi-level intake outlet at Shasta Dam, for example,
11 wouldn't make much of a difference at all, according to our
12 scientists, in the years when it's most critically needed,
13 and that's the critical drop years.

14 So the benefits just aren't there. Most of the year
15 the water temperature is fine.

16 MR. SPOTTS: I guess the concern is, even though it's
17 statistically low, I guess 4 percent, it just takes one real
18 bad year to hurt the resources. Most of the time we are
19 fine. But on the other hand, if that worst case comes
20 true --

21 MR. SCHEIDT: I guess I'm saying it would happen
22 anyway with the multi-outlets. That's what our analysis
23 shows. But we are still studying the problem.

24 MR. HULLSIE: I'd like to add to that. What we did,
25 we've been operating coordinatively for a long time, and in

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1 1977 we did take and we did use the capability of Oroville
2 for the satisfaction of cold water for both the two Federal
3 hatcheries so that we did not lose that particular crop of
4 salmon.

5 So I do think that the coordination of the two
6 projects does allow this in even a drought year from the
7 standpoint of hatchery facilities.

8 MR. MC DANIEL: Questions?

9 Well, I do thank you for coming, and the comments
10 that we have will be considered in completing the document.
11 Again, thank you.

12 Yes. Horn?

13 MR. STURN: I noticed in the draft report that there
14 is some mention to allocate some of the cost to water
15 quality. To me, I'm not going to talk about that, because
16 all through the years, at least to the extent that I know,
17 water quality has not been a legalized function on the part
18 of the Federal Government and the State to which cost may be
19 allocated.

20 We don't, obviously, enhance water quality just for
21 the heck of it, because there is some ulterior motive or
22 purpose of improving the water for fish and wildlife or
23 improving it for recreation purposes for swimming or
24 improving it to increase its use for irrigation purposes, et
25 cetera.

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1 So in theory, I think the National Water Commission
2 Report -- which, to me, in 1973, was still the best and most
3 comprehensive report ever published -- does not recognize
4 water quality as the purpose to which cost may be allocated.

5 So in this case, if there are -- if there is that
6 suggestion, then I recommend that, instead, whatever costs
7 that are required to enhance the water quality be
8 sub-allocated to irrigation or to whatever other purposes
9 can in fact be enhanced by improving the water quality.

10 MR. MC DANIEL: Now, would you identify yourself and
11 who you represent for the record, please?

12 MR. STURN: I am Norman Sturn. I represent no one
13 right now.

14 MR. MC DANIEL: Yourself.
15 Jim, can you respond to that?

16 MR. TURNER: Well, yeah. I would like to just say,
17 first of all, the Coordinated Operation Agreement itself
18 and, as far as I'm aware, the environmental documentation
19 does not address cost allocations in any way, shape or form.

20 What you may be aware of is that the bill which Mr.
21 Sharpe made reference to, before that was recently passed by
22 the House of Representatives to authorize the Secretary of
23 the Interior to enter into and execute the Coordinated
24 Operation Agreement, has some language with respect to
25 allocations of cost in that particular bill.

1 But that is not at all the subject addressed in the
2 Coordinated Operation Agreement itself or in the
3 environmental documentation. The cost allocations is a
4 totally different area than is addressed in either of those
5 documents.

6 So what I was interested in is if you could advise us
7 as to where it was you had gotten the indication that we
8 were dealing with a cost allocation scenario there.

9 MR. STURN: I could do that subsequently.

10 MR. TURNER: Because that's something we were not
11 attempting to address in any negotiation sessions.

12 MR. SHORNER: No.

13 MR. MC DANIEL: Are there any further questions? If
14 not, the meeting is adjourned.

15 (Whereupon, the proceedings concluded.)

16 --00--

1 REPORTER'S CERTIFICATE

2 --00--

3 STATE OF CALIFORNIA)
4 COUNTY OF SACRAMENTO) ss.

5 I, SHERRY L. LLOY, certify that I was the Official
6 Court Reporter, and that I reported verbatim in shorthand
7 writing the foregoing proceedings; that I thereafter caused
8 my shorthand writing to be reduced to typewriting, and the
9 pages numbered 1 through 19, inclusive, constitute a full,
10 true, and correct record of said proceedings:

11
12 BEFORE: United States Department of the Interior
13 Bureau of Reclamation

14 CASE: Public Hearing re:
15 DEIS/EIS for the proposed Coordinated
16 Operation Agreement between the Bureau's
17 Central Valley Project and the State Water
18 Project.

19 DATE: Tuesday, October 22, 1985

20 IN WITNESS WHEREOF, I have subscribed this
21 certificate at Sacramento, California, on the 25th day of
22 October, 1985.

23 *Sherry L. Lloyd*
24 SHERRY L. LLOY
25 CSR No. 5907

--00--

PUBLIC HEARING
on the
DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT
for the
COORDINATED OPERATIONS AGREEMENT

--o0o--

In the Matter of:

Statements and Public Comment
on the Draft Environmental
Impact Statement/Report for
the Coordinated Operations
Agreement between the U.S.
Bureau of Reclamation's
Central Valley Project and
the California State Department
of Water Resource's State
Water Project.

--o0o--

held at

1331 Concord Avenue
Concord, California

--o0o--

THURSDAY, NOVEMBER 7, 1985

7:30 O'CLOCK P.M.

--o0o--

Reported by:

L. ROB WELLS

CAPITOL REPORTERS

REPORTERS & GENERAL COURT REPORTERS
200 ALVARADO BLVD. SACRAMENTO, CA 95811
(916) 448-7731

APPEARANCES

--o0o--

PANEL MEMBERS PRESENT

JAMES McDANIEL, Chairman

JIM TURNER, DOI Solicitor's Office

BOB SCHROEDER, Bureau of Reclamation

KARL WINKLER, Department of Water Resources

LARRY MULLINIX, Department of Water Resources

--o0o--

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THURSDAY, NOVEMBER 7, 1985, 7:30 O'CLOCK P.M.

CONCORD, CALIFORNIA

--o0o--

MR. McDANIEL: Okay. If we could get started
We'd like to welcome you all to the second meeting on
the Environmental Impact Report, Environmental Impact
Statement for the Coordinated Operating Agreement.

Before we get the meeting started, I would like
to introduce the head table. To my right, your left,
we have Jim Turner with the Department of Interior
Solicitor's office.

We have Bob Schroeder with the Bureau of Reclamation,
the Sacramento Region. On my left is Larry Mullinix. He's
a division engineer with the Department of Water
Resources, Division of Operations. We have Karl Winkler.
He works with the Central District, and he's the person
who's responsible for putting that document together.
So if you have complaints about the length of it, I'd like
for you to discuss it with him and not me.

The purpose of the meeting is to receive comments
on the Joint Environmental Impact Statement/Environmental
Impact Report on the proposed Coordinated Operation
Agreement for the Central Valley Project and State Water
Project.

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The meeting is being recorded and the proceedings will be summarized.

The purpose of this meeting is to hear your comments on the document. However, we will be taking written comments, and anything you care to add or give us in writing we will receive; be taking those comments through November 3rd of this month. November 13th, I'm sorry.

Now, the report that we're going to be discussing this evening explains the purpose and objectives of the draft document, which is to evaluate the environmental consequences of the proposed action of signing the Coordinated Action Agreement and the alternatives to that proposed action.

The process started in a series of scoping meetings that were held throughout the State during August of 1983.

Since that time a number of public negotiating sessions on the agreement were conducted. This occurred during 1984 and 1985.

The negotiators reached an agreement November 20, 1985, and we completed a draft EIS/EIR in September and distributed it at the same time.

The public review period ends on November the 13th, 1985, and this is the second meeting that we've held on the document.

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Written comments and comments received at this and the Sacramento meeting will be incorporated in the final document and a Notice of Determination will be filed with the Department of Water Resources and a Record of Decision filed by the Bureau of Reclamation.

We expect the process to be completed about January of next year.

I might tell you how we're planning to conduct the meeting. You were asked to sign a card if you care to make a statement, and I do have half a dozen cards at the present time.

We'd ask you, if you have a lengthy statement, if you would please summarize so that we give everyone an opportunity to be heard. And at the end of the period we will take a few minutes and answer any questions or at least attempt to answer any questions any of you might have concerning either the document or the process it went through.

Before we get started with the statements, we will have a brief statement from the Bureau of Reclamation, and Bob Schroeder will be making that statement. And Larry Mullnix will be making a brief statement from the Department of Water Resources.

Bob, with that, would you proceed?

MR. SCHROEDER: Thanks, Jim. I think really that

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the only thing I'd like to say is that this is a public hearing or meeting, principally on receiving comments on the EIS/EIR; on the environmental impacts of the COA, not a hearing or meeting on the COA itself or the proposed legislation.

Certainly we'll be happy to receive any comments that you have, but we'd like to spend as much time as we can getting your thoughts on the environmental impacts of the COA rather than some of these other related aspects.

MR. MCDANIEL: Thank you. Larry?

MR. MULLNIX: I really don't have anything more to add. I think we ought to limit that to that regard. What this hearing is for is on the EIR and EIS.

MR. MCDANIEL: Okay. With that we'll get started. To lead off we have John Lawrence representing Congressman George Miller.

John, would you proceed? I guess I didn't give you time to get prepared.

MR. LAWRENCE: Usually we start things late in Washington.

Mr. DeVito is handing out a copy of a statement by Congressman Miller.

My name is John Lawrence. I'm Congressman George Miller's administrative assistant in Washington, and I'm appearing here today on his behalf. He's still in

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Washington. The House of Representatives is in session.

I'll move through this statement, reading some and summarizing other portions, and then if you have specific questions or comments, I'd be glad to respond to them.

This draft Environmental Impact Statement is on the Coordinated Operating Agreement, a critical agreement for people of this area, in particular, Contra Costa County and the entire Bay Area.

The agreement provides a framework for the management of State and Federal Water Projects and assures that both projects at least are committed to the protection of Delta water quality.

By guaranteeing Delta water quality, this agreement can help to end the water wars and relieve the legislative paralysis which has long crippled our state.

This will benefit all Californians, north and south, and those in the Central Valley, Southern California, and the Delta as well.

This agreement is an historic one. And it is so sweeping that the Congress has, on a regular basis, reviewed its provisions to assure that it is both fiscally responsible, environmentally sound, and administratively feasible. And I think that it would be appropriate at this point to say that as Congressman

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1 Miller has said to the individual members of the Department
2 of Water Resources and the Bureau in the past, that
3 we are very grateful for the attention that you people
4 have given, for the professionalism, for the attentiveness
5 to the concern of the people in Contra Costa County and
6 the Delta area in general in the development of this
7 Coordinated Operating Agreement.

8 The House of Representatives has also passed
9 legislation, HR 3113, introduced by Congressman Miller
10 to mandate the protection of water quality in the Delta
11 and to authorize the Bureau of Reclamation to enter into
12 the Coordinated Operating Agreement that is the subject
13 of this hearing tonight.

14 We are hopeful that the Senate will act on that
15 legislation in the next few weeks, and we would note that
16 both of our State Senators, Alan Cranston and Pete Wilson,
17 have endorsed passage of Congressman Miller's legislation
18 in its current form.

19 In addition, a wide array of diverse and usually
20 antagonistic interests throughout our state, including
21 the Metropolitan Water District, state and federal water
22 contractors, and environmental organizations, agree that
23 HR 3113 is a "peace treaty" which should be enacted without
24 further delay.

25 Because the legislation that Congressman Miller

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1 has introduced and which the House has already passed is
2 so critical to the implementation of the Coordinated
3 Operating Agreement, he wants to make several statements
4 to clarify its intent and its relationship both to the
5 agreement and the Environmental Impact Statement.

6 Most simply, this bill authorizes the Secretary
7 of the Interior to execute the Coordinated Operating
8 Agreement, which is an appropriate action given the scope
9 and breadth of this agreement.

10 It directs the Secretary of the Interior to
11 operate the Central Valley Project to meet the standards
12 for the Delta and the Bay as established by the State
13 Water Resources Control Board.

14 We should note that the legislation that has been
15 passed by the House of Representatives, in addition,
16 requires certain changes in law and the proposed
17 Coordinated Operating Agreement which are essential to
18 assure that its intended purposes are met.

19 Those of us in the Delta, whose water quality has
20 deteriorated as a result of the exports of the two
21 projects, the State and the Federal Water Projects,
22 the Operating Agreement and its implementing legislation,
23 must provide a very fundamental and a very basic assurance:
24 That our water quality will not be undermined through the
25 signing of new water delivery contracts or with the

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1 construction of additional units of the Central Valley
2 Project.

3 The failure of the Bay and Delta area to have
4 these legitimate demands recognized by water planners
5 in the past has led to the regional conflicts and
6 stalemates which have injured all Californians.

7 The legislation obligates the Federal Government
8 to meet State water quality standards for the Delta and
9 the Bay, independent of the Coordinated Operations
10 Agreement itself, as a separate matter of law. It
11 should be clear why we have chosen to do this.

12 It is simply impossible for the Federal Government
13 to, on the basis of an agreement which can be violated
14 or which can be abrogated at any time, to go forward
15 and sign long-term water service contracts or approve
16 the construction and operation of major water facilities.

17 We need the same guarantees over long periods of
18 time that the people who will benefit from those
19 contracts and those projects will. Therefore, it is
20 simply not enough to have a Coordinated Operating Agreement
21 that assures that Delta water quality is to be preserved,
22 it is necessary to have that as an independent matter
23 of law, and that is what Congressman Miller's legislation
24 will do.

25 The legislation provides an additional safeguard

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1 to the 350,000 customers of the Contra Costa Water
2 District -- and it's a good thing it does here tonight --
3 whose only source of drinking water is the Delta.

4 This legislation guarantees in federal law that
5 specific water quality standards, at least as good as
6 those contained in D-1485, will be maintained at the
7 District's intake.

8 The COA allows the Federal Government to enter into
9 contracts for the conveyance and purchase of Central Valley
10 project water. We believe that these contracts constitute
11 a very significant departure from past practices. And
12 while we do not theoretically object to them, we do not
13 believe they ought to be approved simply by administrators
14 without adequate public review or review by the Congress.

15 We believe that the Congress, which authorized
16 the project, must have an opportunity to examine the
17 conformity of these contracts with mandates laid down
18 in federal statutes governing the utilization, sale
19 and development of federal water. For that reason, HR 3113
20 requires Congressional approval of these contracts.

21 Similarly, the bill provides that the Secretary
22 may not terminate the Federal Government's participation
23 in the Coordinated Operating Agreement without first
24 submitting to the Congress a report outlining his reasons
25 for doing so for a period of 180 days. We simply cannot

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1 allow a situation where the commitment of the Federal
2 Government to protect the Delta rests solely on an
3 agreement which can be violated at the whim of the
4 Secretary of the Interior.

5 The Coordinated Operating Agreement will allow for
6 better planning and coordination, but it obviously cannot
7 prevent shortages that may occur -- and in all likelihood
8 will occur -- in the amount of project water available
9 to meet contractual commitments and State water quality
10 standards.

11 When more shortfalls do occur in the future,
12 this legislation mandates that the Secretary reduce
13 deliveries to all users in order to meet Delta water
14 quality standards.

15 The first responsibility for enduring those
16 reductions will come from agricultural contractors
17 before reductions are imposed on municipal users who
18 lack available alternative sources of water for essential
19 human health and safety.

20 Just as policy must come before plumbing, people
21 must come before plants. This is the basis upon which the
22 project has been operated, with the cooperation of
23 all parties, and we believe that it is a sound basis
24 for future operations as well.

25 The legislation also requires that water sold

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1 Action" option is an option that we cannot afford.

2 We have already seen the evidence of what no
3 action will produce. This year we've read the reports
4 of historically low bass counts and other fish populations
5 have been decimated, and we have no assurance that
6 drinking water supplies will not grow worse.

7 We cannot live with that uncertainty in this
8 county and that's why the COA and HR 3113 are urgently
9 needed at this time.

10 The COA will not solve every water policy problem
11 facing California. The selenium crisis at Kesterson
12 Reservoir, which is the direct result of irrigation
13 practices, illustrates how serious and unpredictable
14 future challenges will be.

15 The trust and cooperation which has produced the
16 consensus behind HR 3113 and the COA will be essential
17 if we are to avoid falling back into the suspicion
18 and regional division which has long characterized
19 water policy in this state.

20 The COA and our legislation are lessons for all
21 of us in the right way to make policy decisions on major
22 policy issues: In the open, with full public participation
23 and review, and with a commitment to those goals which
24 serve best the State as a whole.

25 We believe that the time has come to move forward

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1 and to end the suspicion and the stagnation which has
2 impeded sound water policy in this state for far too
3 long.

4 The COA, the legislation, the EIS that we're
5 testifying about tonight provide the framework for
6 accomplishing that goal. And we urge the Bureau and
7 the State to proceed with their approval for this
8 document.

9 MR. MCDANIEL: Thank you, John. Next, we have
10 Miss Lori Griggs. She represents the Committee for
11 Water Policy Consensus.

12 MS. GRIGGS: Thank you, Mr. McDaniel. Members
13 of the hearing panel, I'm here this evening representing
14 our committee chair, Supervisor Sunne Wright McPeak,
15 who is a supervisor from Contra Costa County. She
16 regrets that she is unable to be here this evening
17 to provide this statement in person.

18 I serve as project director for the Committee
19 for Water Policy Consensus, and we're very appreciative
20 of the opportunity to testify before you this evening.

21 The Committee for Water Policy Consensus is a broad-
22 based and balanced group of diverse interests from the
23 12-county San Francisco Bay-Delta area, a region that
24 is home to seven million people.

25 This committee of public and private leaders

1 includes elected officials, representatives from
2 business, industry, labor, water agencies, environmental
3 and public interest organizations, agricultural interests,
4 the academic community, and individuals with water
5 resources expertise

6 The primary purpose of the Committee when it
7 organized in 1983 was to develop a water policy consensus
8 that reflects economic efficiency and environmental
9 protection.

10 The Committee for Water Policy Consensus is
11 strongly committed to securing protections for Northern
12 California and for the San Francisco Bay-Delta region
13 before there is any increase in the level of exports
14 out of the Delta.

15 We see the Federal-State Coordinated Operation
16 Agreement as being a critically important Bay-Delta
17 protection measure. We support both the COA and HR 1113,
18 authorizing the Secretary of the Interior to sign the
19 COA.

20 We're extremely pleased that the Federal
21 Government, through the COA and HR 1113, now has made a
22 commitment to providing its share of water quality
23 protections for the San Francisco Bay-Delta estuarine
24 system in accordance with state-determined standards.

25 We are concerned, however, that the COA itself

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1 does not commit the Federal Government to meeting
2 future water quality standards set by the State Water
3 Resources Control Board. The COA only obligates the
4 U.S. Bureau of Reclamation to meeting the current
5 standards as contained in the State Board's Decision 1485.
6 These standards are expected to change within a few
7 years. Nevertheless, the COA assuredly represents a
8 step in the right direction, and we wish to commend the
9 efforts of the federal and state negotiators in bringing
10 about this historic agreement.

11 It must be noted that we do have some concerns about
12 the draft EIR/EIS for the Coordinated Operation Agreement.
13 Our major concern focuses on the assumption in the EIR/EIS
14 that the Decision 1485 water quality standards provide
15 adequate protections for the Bay-Delta estuarine system.

16 It is clear to us that the Decision 1485 standards
17 do not adequately protect the Bay-Delta estuary. The
18 horrendous decline in the Striped Bass Index is compelling
19 evidence of this.

20 The State Board set a goal in 1978 for a Striped
21 Bass Index of 79; the index has declined precipitously
22 to 6.5, a level even lower than during the 1976-77
23 drought and, in fact, the lowest point in the history
24 of the Index.

25 This situation is not acceptable, and Decision

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1 1485 must be modified to insure the health of the striped
2 bass as well as other fish and wildlife in the estuary.

3 Additionally, Decision 1485 does not include
4 adequate standards for Suisun Marsh, San Francisco Bay,
5 and the South Delta. These inadequacies should be
6 noted in the EIS/EIR. It is wrong to say that by simply
7 meeting Decision 1485 standards, the Bay-Delta estuary
8 will be protected.

9 We also note that Decision 1485 was rejected
10 by the Superior Court as improperly promulgated. If
11 the EIS/EIR is to make the assumption that Decision
12 1485 adequately protects environmental values, then
13 detailed information must be provided to document the
14 validity of this assumption.

15 Additionally, the EIS/EIR should have more
16 information on the effect on San Francisco Bay of
17 diversions made by these two major water projects.
18 Information on the effect on the estuary of return flows
19 from agricultural wastewater drainage from the San Joaquin
20 Valley also should be included.

21 The COA provides for approximately 900,000 acre-feet
22 of water to be made available from the Central Valley
23 Project after execution of the agreement. The draft
24 EIS/EIR discusses possible uses of this water, including
25 sale to other contractors.

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1 The EIS/EIR should include an analysis of the
2 benefits to the Bay-Delta estuary if this amount of water
3 was used to improve water quality in the estuary --
4 above Decision 1485 standards -- by allowing the water
5 to flow through and out of the Delta rather than being
6 made available for export out of the Delta.

7 We should note that the economic damage due to
8 losses in the striped bass, chinook salmon, and steelhead
9 trout, Central Valley fisheries amounts to \$117 million
10 a year, with an additional loss of \$130 million in
11 recreation benefits.

12 These are losses that will be suffered annually
13 as long as these three fisheries remain at their current
14 depressed levels. The source of this information is
15 a report prepared by Meyer Resources for the California
16 Department of Fish and Game.

17 Another suggestion for the EIS/EIR is that an
18 analysis of the various methods by which the COA can be
19 terminated, either unilaterally or by both parties
20 should be provided. There appears to be several ways for
21 the two parties to terminate the agreement.

22 Generally, this concludes our general comments
23 on the draft EIS/EIR. I have a few additional specific
24 comments. These are in writing. I think I will give
25 those to you in the written record.

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1 But I would like to know about one of them and
2 that is a concern that is raised where on page 84 of
3 the document, there is a short discussion concerning
4 Friant Dam and Millerton Lake.

5 Friant Dam is located on a stream tributary to
6 the San Joaquin River. The San Joaquin River is one of
7 the major tributaries to the Delta. An explanation should
8 be made as to why water diversion facilities on the
9 San Joaquin River, such as Friant Dam and New Melones
10 Dam, are not governed by this agreement and why they
11 are not expected to contribute to Bay-Delta water
12 quality.

13 In concluding our remarks on the draft EIS/EIR, we
14 note that we will monitor with interest the progress
15 on the Coordinated Operation Agreement. We look forward
16 to the federal-state partnership in protection that is
17 represented by the Coordinated Operation Agreement.

18 We thank you for this opportunity to share our
19 concerns and suggestions with you.

20 I'll give you the written statement.

21 MR. MCDANIEL: We will now call on John DeVito.

22 MR. DEVITO: Thank you. Mr. Chairman and Members
23 of the Panel--

24 MR. MULLNIX: Thank you for the use of the hall.

25 MR. DEVITO: Let me just say that between the

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1 Bureau of Reclamation and the Department of Water
2 Resources, we are a committed member to your family.
3 You are welcome to use this facility at any time.
4 We are honored to have you here.

5 My name is John DeVito, representing the Board
6 of Directors of the Contra Costa Water District. And
7 I was reminded that on July 10th, and I was here at
8 the time, 1957, Clyde Spencer, Regional Director of the
9 Bureau of Reclamation, sent correspondence to Harvey
10 Banks, Director of the Department of Water Resources,
11 and Clair Hill, Chairman of the California Water
12 Commission, saying that we consider the obligation
13 of the Central Valley Project fulfilled by simply meeting
14 the standards of the Water Rights, Tracy Pumps, the
15 exchange contractor, and Contra Costa Canal.

16 However, shortly thereafter in testimony before
17 the then State Water Rights Board and later the State
18 Water Resources Control Board, the Bureau of Reclamation
19 said, "We have no obligation to provide water of the
20 quality suitable for M&I use for the Contra Costa Water
21 District other than that which occurred absent the
22 project."

23 In other words, Secretary Cecil Andrews said,
24 "We take your money for M&I water suitable for M&I,
25 that's \$9 Delta service charge plus interest on capital

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1 plant, but we leave to the whim of nature to provide
2 you that water."

3 It is for that reason that this District since
4 the '50s has sought a simple amendment to the Federal
5 Central Valley Project Act of 1937, which actually then
6 would cause all the rivers of the State of California
7 to operate by the same set of rules; those owned by
8 the Department of Water Resources as well as the Bureau
9 of Reclamation. And we have a state-wide interest in that.

10 We consider the Delta as the water crossroads
11 for the entire State of California, and when we look at
12 Congressman Miller's bill 1331 which implements the
13 Coordinated Operations Agreement -- and this was part
14 of my testimony before Congressman Miller's committee
15 in Washington -- just look at the numbers, your numbers,
16 the Department of Water Resources/Bureau of Reclamation.

17 The Bureau of Reclamation and the State of
18 California exports 86 percent of the water within about
19 six million acre-feet in '81 and an average of six point
20 two million acre-feet per year. Eighty-six percent of
21 that water goes to the San Joaquin Valley. Ten to twelve
22 goes over the Tehachapis.

23 My testimony in Washington said the Lyons,
24 Coelho, Lehman, and Bechan need the highest water
25 quality in the Delta because they are the major importers

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1 of that water supply. If you take care of the Lyons,
2 Coelho -- Congressman Tony Coelho, Congressman Rick
3 Lehman, and Congressman Chip Bechan -- who import 86
4 or export from the Delta 86 percent of the supply -- and
5 they need that water for the health of the soils of the
6 San Joaquin Valley, the salt balance, the health of
7 the plant life, and certainly the economic health of
8 the Valley -- if you take care of those healths of the
9 Valley, with the 86 percent import to the Valley, you
10 will automatically take care of Congressman Miller's
11 2 percent of export or import from the Delta

12 Let me stress that over and over again, that it
13 is the entire area south of Tracy that benefits most
14 from good water quality -- along with us, of course.

15 It is not a singular benefit to this area.

16 May I address the EIS/EIR process? I have a
17 little difficulty with this. Your proposed action
18 says we're talking about an EIR/EIS in terms of execution
19 of the COA draft, the one dated 5/20/85.

20 I really feel that the action that you should be
21 dealing with is implementation of Congressman Miller's
22 3111. Let me explain why. And again, I'm going back
23 to my testimony in D.C.

24 If you take the COA in itself, it just does not
25 stand. It has too many self-destructs in it. It's

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assumptions, I don't think, will stand.

For example, it assumes that Delta Decision 1485 will do certain things in terms of the Bay-Delta estuarine system. It just can't. It's an interim solution in the first place. It's an incomplete solution. In other words, it doesn't even go to the Bay. That will come into the hearings out of the Bay-Delta Plan. And furthermore, it's inadequate.

Let me just mention, from July 15 through April, Contra Costa Canal intake is controlling. It controls at 250 parts chloride, roughly 500 TDS. That's unfit for human health, for municipal and industrial health, and certainly for the soil health, and plant life health, of the valley. That's the inadequacy of that particular decision.

Furthermore, the Coordinated Operation Agreement if signed and if authorized strictly as that unit actually authorizes one set of standards, 1485. And if you look at Section 11, the Secretary can very easily say that in the absence of Congressman Miller's bill that it's in conflict with the directives of the Congress. And that's the end of the COA.

If you look at the self-destruct features of 1482 where either signature, the Secretary of the Interior or the Director of the Department of Water Resources, can

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walk away from that agreement due to one reason or another. That is another self-destruct, if you just take a look at the COA within itself.

I come back again to that very, very important criteria that the implementation of HR 3113, which is in fact a new directive of the Congress; it can't be in conflict simply because the Congress is saying to the Bureau of Reclamation, "Thou shalt operate the project to the meet the water quality standards for the Bay-Delta estuarine system as laid down by the Board from time to time."

That is a lot different than merely having a COA. Then, incidentally, it says, "Thou shalt implement a COA in order to develop an operational plan."

I'd like to, for the record, ask that we be allowed to provide you with a written statement prior to your date of November 13th. I'd like to have my staff meet with your staff. There are some technical problems that we have.

One of the major ones is your water quality projections methodology. And this is something that we'd like to bring the Bureau of Reclamation and the Department of Water Resources into a common area of methodology where you all have a sure faith, a positive faith that it's going to happen in terms of your

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projections and we can rely on it.

Finally, and again, we believe the EIR/EIS should should deal with a proposed action not limited to the execution of the COA, which cannot stand on its own, but a reauthorization of the Central Valley Project as envisioned and intended under HR 3113 which will, in fact, for the first time in history cause all the rivers of the State of California to operate under one set of rules for the benefit of mostly the Valley and the Tehachapi area. Thank you.

MR. MCDANIEL: Thank you, John. We will be happy to meet with your staff at any time. Should we call you or would you like to call us?

MR. DEVITO: We'll call you.

MR. MULLINIX: It will be tomorrow, I bet.

MR. MCDANIEL: Next, I'll call Laura King.

MS. KING: Good evening. I'm Laura King. I'm a staff scientist with the Natural Resources Defense Council.

NRDC believes that the COA is a big step forward and the the Federal Government is agreeing for the first time to meet State Water Quality Standards for the Delta and the Bay. Protection of the Delta and the Bay are clearly needed; it's an important goal. And we think that the COA is an important step in the right direction.

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But we do have several concerns with the COA, in particular for purposes of discussion tonight with the EIS/EIR on the COA.

In sum, the three concerns are: First, the execution of the COA is likely to trigger the signing of many new contracts for CVP water. The moratorium on new contracts imposed by Secretary Andrews in the 1978 will be lifted once the COA has been signed.

We're concerned that all of the water, all of the surplus water available, made available under the COA -- the 900,000 additional acre-feet -- will be contracted away before any is set aside for wildlife refuges where it is badly needed. The EIS does not address this impact.

The second concern is that while some environmental benefits will result from the COA, it will also have some environmental-harmful consequences, which the EIR/EIS documents. But the EIS fails to propose mitigation measures to alleviate these adverse impacts.

The third has been addressed by a previous speaker. The EIS does not address the deficiencies of the existing D-1485 Delta Water Quality Standards.

Now, I'd like to elaborate just a little bit on each one of these points.

The EIS/EIR admits that the moratorium on new

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1 contracts will be lifted after the COA is signed, but
2 it doesn't analyze the environmental consequences of
3 this direct result of signing the COA.

4 As the previous speaker said, about an additional
5 900,000 acre-feet will be made available in the CVP as
6 a result of signing the COA. It sounds like a lot
7 of water but not when you consider the competing demands
8 for that water.

9 The Bureau says that it has long-term obligations
10 for seven point one million acre-feet, whereas, right
11 now it's delivering about six point two five million
12 acre-feet. That sounds like to me that they have already
13 got plans to deliver all that excess water.

14 But the Fish and Wildlife Service has recommended
15 that about half a million acre-feet be set aside for
16 wildlife refuges. We think that's something that the
17 Bureau needs to look at in its EIS.

18 Wetlands habitat in California is in critical
19 need of this water. As home to sixty percent of the
20 Pacific Flyway waterfowl population it has shrunk from
21 a total of about four million acres, originally, to a
22 fraction or about three hundred thousand today.

23 California Waterfowl Association estimates that
24 two-thirds of the remaining marshes would be lost if water
25 is not set aside for preservation.

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1 We need to set aside fresh water. It's particularly
2 acute now as we are becoming aware of the problems of
3 using irrigation drainage water for Wetlands. It's
4 becoming clearer that this water in many cases cannot
5 substitute for fresh water.

6 The EIS states that the environmental effect of
7 signing new water contracts will be addressed later on
8 in EIS's on water marketing and on individual contracts.
9 We feel this is an inadequate process because the Bureau
10 and the Department need to assess the impacts now at
11 the decision point that is going to trigger the signing
12 of these new contracts.

13 The whole body of NEPA law supports analyzing the
14 impacts at the point of decision that is the beginning
15 point, before a whole series of events unfolds.

16 That these new contracts will be signed are
17 clearly likely consequences of the action before the
18 Department and the Bureau. Therefore, they must be
19 analysed in this document.

20 Furthermore, this action itself has a direct
21 effect on the amount of water that will be made available
22 to the Bureau to provide to Wetlands because the amount
23 of the split between the Central Valley Project and the
24 State Water Project determines how much is available
25 to the Federal Government to provide to Wetlands.

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1 So, this specific action itself has a direct
2 effect on how much water could be made available to
3 Wetlands. Therefore, the impact on Wetlands needs to
4 be analyzed in the EIS.

5 NEPA also requires an evaluation of cumulative
6 impact. By ignoring the impact to Wetlands of this
7 decision, the EIS has overlooked a very significant
8 cumulative effect of the decision.

9 I'd like to just comment, too, it's my understanding
10 that what the Bureau is planning to do is to do a series
11 of EIS's on water marketing in various service areas
12 and then EIS's on individual contracts as they deem
13 necessary.

14 If the scoping analysis for the Sacramento
15 marketing program is what the Bureau has in mind,
16 I think it is important to remember that analysis has
17 to be done at some point. And we believe it needs to
18 be done right here in conjunction with the COA -- marketing
19 CVP-wide, not just on a service-area basis; not just
20 on an individual contract basis.

21 The EIS does admit that some harmful environmental
22 consequences will result from signing the COA, primarily
23 due to water releases from reservoirs during dry years,
24 which will raise downstream river temperatures.

25 To cite a consequence of this, the EIS indicates

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1 that incremental mortality of chinook salmon in the
2 Sacramento River would increase during dry years by
3 two to twenty percent at current operation levels and
4 by thirteen to seventy percent at the level of operation
5 assumed in the year 2000.

6 In fact, Fish and Wildlife said in its draft
7 report on the COA, quote, "The extirpation of the
8 winter-run salmon race is not inconceivable under this
9 action."

10 Given the serious nature of these potential impacts,
11 we believe that the EIS needs to propose mitigation
12 measures to help alleviate the impacts. Instead of
13 doing that the draft simply points to existing laws and
14 regulations and says more studies are needed. It doesn't
15 make any specific proposals.

16 Examples of the types of mitigation measures,
17 specifically, that would be appropriate can be found
18 in the Fish and Wildlife Service's draft report:

19 Then the third area that we find the EIR/EIS to
20 be inadequate is in its treatment of decision for 1985
21 standards.

22 As Miss Griggs pointed out, it is widely believed
23 that those present standards do not provide sufficient
24 protection for the Delta, and the State Board is planning
25 to address this by promulgating new standards in 1987.

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We consider the failure of the COA to make provision for stricter standards a major shortcoming. But regardless of whether the COA makes provisions for stricter standards, the EIS must discuss this limitation of the COA.

It must address what will happen to the CVP's ability to meet new standards if all the water has been contracted away.

In conclusion, it must be recognized that the COA, while in some respects a step forward for the environment, also has some serious negative implications for the environment.

Because the EIS does not analyze the negative consequences of the COA, we believe that it is fundamentally inadequate. Thank you.

MR. MCDANIEL: Thank you. We next have William Davoren.

MR. DAVOREN: Thank you, Mr. McDaniel. Good evening, Gentlemen.

I think we last saw each other in this setting at Stockton, about two years ago? And I remember bleeding all over the floor because I learned there, from a State representative, DWR spokesman, that there was to be no EIR. And that was because there was no physical impact of the COA. Do you remember all that?

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I was pretty vociferous about it. You shouldn't have forgotten so quickly. I was glad to learn, about a year and a half later, that you did decide, golly, it does require an EIR. And I'm glad you're here tonight. And I'm glad there's a draft EIR/EIS out. And I'm glad that the physical aspects of this project are beginning to be recognized.

To lend a little drama to what you're about, I clipped Jim Freeman's fishing scout report out of today's Chronicle, and we'll get to the specifics in a minute of the inadequacies of the statement.

I just wanted to read these because a year or two from now you might not be reading these:

"On the Bays, plenty of bass, five to nine pounds some go to twenty pounds. San Pablo Bay with bass thirteen to twenty-seven pounds. Suisun Bay, stripers to thirty pounds. In the Delta, stripers in the thirteen-pound class."

Well, you might have a hard time finding reports like that starting next year, year after that. And I think one of the reasons you might have a hard time doing that is the failure of the agencies who write such reports such as this to recognize real time, real problems.

And, for example, I challenge you to find the word "Striped Bass Index" in this report. I don't think

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you will. I couldn't find it. If you can correct me on that I hope you do it and do it soon.

The Striped Bass Index, until about five years ago, was hailed loudly every time I opened my mouth criticizing it, as the best young-of-the-year fishery index in the United States. And I have accepted that.

But my question is, something must be wrong because the Striped Bass Index is crashing and, of course, the fishery is crashing, too, as we know it.

And the Striped Bass Index represents the highest art form we have of federal and state biologists working with federal and state engineers to determine the effects and impacts of the federal and state water projects on the Bay-Delta estuary.

And you don't know today why the Striped Bass Index, predicted and observed, has been out of whack since 1977.

Yet, for years you planned projects such as the Peripheral Canal on the basis of the accuracy of projecting 110 Striped Bass Units if we had the Peripheral Canal.

We've got the D-1485/Delta Plan in place. And it is based on, without project calculations, as you know. And the calculus on with that project Striped Bass Index is 79.

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So, D-1485/Delta Plan is premised on obtaining a Striped Bass Index of 79. That is not mentioned in here. The highest the Striped Bass Index has been since 1977 is 48. It reached its lowest level this year, 6.3. That's not mentioned in here.

What you are neglecting is 40 years of government biology. That's what you're neglecting. And there's not a word of it in here. And I really object strongly to that. And you can start making corrections in terms of that failure; I'd recommend that you start rewriting on page 49, where you cite "striped bass."

The next, most serious inadequacy I think you have in the report is comparable to "missing the boat" on 40 years of biology by your own people. And that is on the cash value of these fisheries. You've missed it there, too. You can find a number on page 49. You can find the number, supposed values of striped bass -- annual values.

It is a totally dated number. You can begin to get some adequate numbers in this report cited earlier by Lori Griggs and others -- the Meyer Report.

It begins to put modern valuations on the subject you people have been dealing with all these years as representatives of the agencies. I am concerned that there's no serious mention of toxics and the project's

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relationships to toxics in this evaluation. Someday you are going to have to accept systemic toxification of the system by your own projects. I will do all I can to make you accept that very soon.

I'm thinking, of course, of the fact that D-1485 and Delta Plan concern water flows, water controls of flows, and Delta Plan part of it, which is always neglected -- you just hear people say 1485; that's water rights -- somebody better take a closer look at the part behind the slash which is the Delta Plan; shorthand for the Water Quality Control Plan for the Sacramento, San Joaquin Delta and Suisun Marsh.

That is an official federal-state-approved plan under Section 303c of the Clean Water Act. So, I would recommend in addition to that one sentence you have in Appendix "F," saying that you do comply with Section 404 of the Clean Water Act, I suggest whether or not you do comply with Section 303c of the Act as that Act is applied in the form of the Delta Plan.

Another missing phrase out of the past -- I can't find in here -- refers to a project we all used to know a lot about and hear a lot about called the San Luis Drain. I can't find those words in here. And I think we need a more apt description of the status of that drain. And particularly I believe you need a description

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of what the federal and state projects are going to do about situations resulting in toxification of the systems which they, themselves, produce. And, of course, I'm referring specifically to the areas west and north of Mendota, served by the Bureau of Reclamation, which from 103,000 acres of tile-drained lands produce flows directly and indirectly into the San Joaquin River which are chemically equivalent to the flows which created a toxic sump at Kesterson in two years.

These flows have been coming into the San Joaquin River and into the Delta and the Bay for 30 years. Now, it hasn't been 103,000 acres for 30 years, but that's the total number today, we're told.

I think those are the kind of things that must be considered. If you sign an agreement here, if you have an agreement which makes everyone happy who's in the water establishment because it makes it easier to take more water out and move it to paying customers somewhere else, you've got to start considering these impacts that have been neglected for 40 and 50 years. In the State project's case, only been neglected for 25.

I share strongly Lori Griggs feeling -- I'm sorry --

MS. KING: Laura King.

MR. DAVOREN: Laura King's feeling on the impacts on the wetlands of the Central Valley. This is another

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unspoken problem that doesn't get mentioned. But it's another area of serious neglect by the Bureau of Reclamation in that they have never provided water, power, or anything else, in a generous way, to the refugees that they have been stuck with as mitigation in the Central Valley.

And we're talking here about the disappearance of two million acres of wetlands after 1930. And that disappearance was caused by highly-subsidized irrigation agriculture delivered through the Bureau of Reclamation.

Now, we have wonderful mitigation like the San Luis Drain Project itself. But remember, in just 1979 this was all covered in a report and a decision by the responsible agencies that this drainage was going to be taken care of with regulating reservoirs also serving as wetland resources and marshes, six or seven of them, along the drain. And this would qualify the project for at least 50-percent reimbursability as a public cost -- to create six or seven little Kestersons, we've learned.

I will give you some of this in writing to make it easier on you, and I'll cite page numbers. And I'm glad you're here. And I'm glad you've done an EIR and EIS. And I find it quite inadequate, and I hope you do a better job in the final. Any questions?

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MR. MCDANIEL: Thank you, Bill. Next, we have David Okita.

MR. OKITA: Thank you. I'm speaking for the Contra Costa Board of Supervisors, who are the governing board of the Contra Costa County Water Agency.

First of all, we'd like to thank you for holding the hearing in Concord, in the heart of the Bay-Delta estuary, which is very much affected by this agreement. And we hope you come back for future encounters with us.

Tom Torlakson, supervisor from the district in the Delta, made a statement at your October 22nd hearing in Sacramento, and I have extra copies of those. And we would like those entered into the record for this hearing. I won't go through them.

We have many of the same concerns that the other people raised about Decision 1485, water quality standards, the striped bass, and we will be outlining those in a little bit more detail in our written statement to you before your deadline. So, I will end with that and just leave you with a few of these.

MR. MCDANIEL: Thank you. We next have Tom Graff.

MR. GRAFF: Thank you. First, I want to congratulate Larry and Dave Schuester, who isn't here, for the years that they have put in on this agreement

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1 to bring it to the point where politicians and
2 environmentalists and others can take potshots at it.

3 I want to harken back to our testimony in Washington
4 last May when we addressed the COA and found three major
5 weaknesses in it.

6 One, we stated that the agreement was only for
7 a limited duration. Two, we stated that the agreement
8 left ambiguous, what would be the Central Valley Project's
9 response, when new Delta standards and, hopefully, Bay
10 standards are adopted by the State Water Resources
11 Control Board.

12 And three, we noted that the agreement included
13 a provision for the sale and vending of CVP water to
14 and by the State Water Project, which would potentially
15 commit a significant amount of additional water to
16 Delta export that would otherwise be available for
17 Delta outflow requirements to meet the needs of the
18 Delta, Suisun Marsh, and the San Francisco Bay.

19 I want to take this opportunity to publicly
20 thank Congressman Miller for in large measure taking
21 care of those three principal concerns in HR 3113.

22 He wasn't able to do all of what we asked him.
23 It is still possible for the Federal Government to
24 weasel out of the COA but only after going through a
25 significant set of gauntlets.

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1 There is no more ambiguity if HR 3113 is passed
2 in its current form as to whether the CVP in the future
3 will have to meet Delta standards and Bay standards,
4 and the commitment to the Wheeling contract is
5 eliminated, basically, by the new legislation as there
6 is a requirement in the new legislation to bring such
7 a contract, if it is indeed negotiated, back to the
8 Congress for further Congressional action.

9 And I think it's quite a remarkable feat,
10 really, principally of Congressman Miller and others
11 who were working on this, that these improvements in the
12 COA were made a part of HR 3113.

13 I also want to thank Senators Cranston and Wilson
14 whom, I understand, have both endorsed 3113 in its
15 current form without amendments and also Governor
16 Deukmejian, who I understand has done the same in a
17 letter to Senator McClure.

18 We are concerned, however, at the Federal
19 Government's continuing reservation about HR 3113.
20 Particularly, I want to refer to a letter dated
21 October 10th, 1985 that Secretary Hodel, actually,
22 I guess it was signed by Assistant Secretary Broadman,
23 if I'm not mistaken, sent up to Senator McClure, raising
24 problems about HR 3113.

25 Let me quote from that letter a few paragraphs

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1 "Implementation of the Coordinated Operating
2 Agreement would free a substantial block of
3 CVP water for which the status is currently
4 uncertain for future water service contracts.
5 There have been numerous requests for
6 additional water from current CVP contractors,
7 although deliveries of additional supplies
8 in some cases would be contingent on the
9 construction of new conveyance facilities and
10 in other cases the new supplies could be used
11 almost immediately.

12 "While we can support HR 3113 to the extent
13 it authorizes and directs the Secretary to
14 execute and implement the May 1985 COA, we
15 have major reservations and concerns with the
16 remainder of the bill."

17 Well, in effect, what the Secretary seems to
18 want to do is to go back to the May draft about the
19 improvements that the House, led by Congressman Miller,
20 put into the legislation.

21 And in particular, let me quote further what the
22 Secretary seems to want to do about the Delta and
23 San Francisco Bay. The letter goes on:

24 "I should be remembered that the COA does
25 not address state water quality standards

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1 for San Francisco Bay. They could not be
2 included since no such standards exist. And
3 it remains uncertain whether such standards
4 will be a component of the new Delta standards."

5 I'm afraid that's right. I am becoming a little
6 worried that the State Water Resources Control Board
7 isn't taking seriously its obligation under past decisions
8 to implement Bay standards. But at least for the
9 moment that Congressman Miller was right when he stated
10 on the floor of the House that that was an expectation
11 of the House of Representatives, that the State would
12 carry through on its promises.

13 The letter goes on:

14 "HR 3113 makes these previously separate
15 considerations part of the present CVP
16 commitment to water quality and as such
17 becomes essentially an open-ended,
18 nonreimbursable commitment."

19 And "open-ended, nonreimbursable commitment"
20 is underlined.

21 It goes on.

22 "Appropriate compromises related to the
23 use of CVP water for water quality purposes
24 are already included in the COA."

25 The implication of that is the most that the

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1 Federal Government wants to do is D-1485. It's been
2 criticized by many other speakers tonight.

3 "We believe that any change from the COA
4 involving the use of CVP waters for
5 salinity mitigation and water quality
6 enhancement must be subject to the general
7 principle of reimbursement. And in support
8 of this position we support and we offer
9 this draft amendment."

10 Now, let me say that the principle of reimbursement
11 in general is one that EDP supports. And when the
12 issue originally came up in the discussions on the bill,
13 we favored a position and officially sent a letter to
14 Congressman Miller stating that we opposed the
15 nonreimbursement provision that indeed appears now in
16 the final draft of the bill.

17 However, what the Administration is asking for
18 is not, if fact, general reimbursement by Central
19 Valley Project contractors of mitigation for their
20 damages caused to the Delta and Bay. Instead, what
21 they would do is have them reimburse only up to the
22 level of the D-1485 standards and then require a signed
23 contract with the State or with some other entity for
24 any improvements in Bay-Delta water beyond the D-1485
25 standards, which is a prescription for never having

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1 those standards be improved. Well, that is totally
2 unacceptable.

3 Now, having said that, let me return briefly to
4 the EIS. I think most of the other, or many of the
5 other speakers, have dealt with the points that I was
6 going to raise.

7 I do think it important to deal with, what about
8 improved Delta standards are going to be required if
9 the Striped Bass Index is ever going to be brought up
10 to some kind of reasonable level -- never mind historical
11 levels -- what about the impact of Bay standards, what
12 about the water that's needed for waterfowl areas
13 throughout the valley?

14 As Miss King said, the EIS claims that future
15 EIS's will deal with this issue. That is not enough.
16 They have got to be dealt with in the final EIS here.

17 In addition, if for some reason HR 3113 is
18 amended, and the termination -- and the Wheeling contract
19 and the "no commitment to future standards" provisions
20 are somehow reinstated, those have to be addressed in detail
21 as well. Thank you.

22 MR. MCDANIEL: Thank you. Let's see. Next we
23 have Mr. Frederick Bold, Junior.

24 MR. BOLD: Gentlemen of the Panel, I would like
25 to suggest to you and to recommend to additions to the

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1 draft EIS/EIR. Let me preface my two recommendations
2 by pointing out something that's rather obvious
3 us in Contra Costa County, the principal thrust, the
4 main force of the Coordinated Operating Agreement is
5 contained in Section 11, wherein, it is stated that
6 the two projects will be operated in conformity with
7 quality standards established by the State Water
8 Resources Control Board.

9 What then is the environmental impact of complying
10 with those quality standards?

11 Well, when Decision 1485 was adopted by the State
12 Board, they published this voluminous Environmental
13 Impact Report which sets forth in detail the physical
14 effect on the environment that those standards will have.
15 And I think it's reasonable to assume that when the State
16 Board re-examines the Delta quality standards in 1986,
17 they will also have an Environmental Impact Report, as
18 indeed we anticipate that the Bureau will in due course
19 publish an Environmental Impact Report on the Drain and
20 other matters.

21 I would suggest, however, that in addition to
22 these physical impacts of Delta water quality standards,
23 that the report should state that the Coordinated
24 Operating Agreement does two important things:

25 First, it sets at rest this issue which has

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1 troubled us for 20-odd years, whether quality control
2 in the Delta is an authorized purpose of the Central
3 Valley Project. And by Congressional action, authorizing
4 the execution of the COA, Congress will be stating and
5 acknowledging that the operation of the Central Valley
6 Project in coordination with the State Water Project
7 to maintain quality standards in the Delta is an
8 authorized purpose of the project.

9 Secondly, I recommend that you add in your
10 statement and EIR the fact that Congressional authorization
11 of execution of the COA completely sets aside and
12 eliminates any possible contention that maintaining
13 quality in the Delta is inconsistent with a Congressional
14 directive.

15 Indeed, this will be a Congressional directive.

16 But the CVP, in coordination with the SWP shall
17 be operated to maintain quality standards in the Delta.

18 Now, I recognize that it could be argued that
19 these are conclusions of law that derive from Congressional
20 action authorizing execution of the agreement.

21 Might I answer such an argument by pointing out
22 that your Environmental Statement/Environmental Impact
23 Report sets forth the accomplishment of the agreement.
24 And I submit to you that these are two very important
25 accomplishments of the agreement that will redound

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1 greatly to the public interest. Thank you.

2 MR. MCDANIEL: Thank you, Fred. That is the
3 list that I have. Are there others who would like to
4 make statements?

5 If not, then we will open the meeting for
6 questions. Are there questions that you might have?

7 MR. OKITA: Can you answer the question that
8 Lori Griggs had about Friant and New Melones not
9 being included in the COA?

10 MR. MULLINIX: I'll give it a try. I guess is
11 the best thing.

12 We, when we first worked on the COA, we looked
13 at the effect of Delta transfers and essentially
14 Friant and the Delta-Mendota Canal are rather tied
15 together in the Exchange Agreement. And we looked upon
16 that as a separate part of the CVP from the standpoint
17 that the water that's going down the system at the
18 present time did not satisfy Decision 1485 standards,
19 a very small portion of it.

20 And that's one of the reasons for leaving out
21 Friant. And, frankly, when we got to New Melones,
22 that there were pro's and con's at New Melones. And
23 this has been worked on since, while New Melones was
24 still in the throws of "Could it be filled?". The Bureau
25 was working with the Board -- or not working with the

1 Board, as the case may be -- on how to operate New
2 Melones

3 And that would have put such a big bite of the
4 apple, I don't think we could have gotten through with
5 the COA as we have today. That's why it was not
6 included.

7 I think the COA as it exists today is the
8 first step in the operation of the facilities and I
9 think there are going to be others further on down the
10 line

11 And if New Melones, as presently envisioned by
12 the Bureau, is a local project and not an export project
13 there is not water rights to go beyond the existing service
14 area.

15 MR. GRAFF: That's fine--

16 MR. MCDANIEL: Would you identify yourself, please

17 MR. GRAFF: I'm Tom Graff. Yeah, but Larr,
18 that's not, in fact, the way it's going to be operated
19 for the next 20-30 years. What's going to be the
20 practical effect of New Melones water coming into the
21 system?

22 MR. MULLINIX: I think the practical effect,
23 until the local water is used, it will assist the South
24 Delta in actually satisfying Delta water quality. The
25 practical effect of it.

1 MR. GRAFF: Then it becomes available as part
2 of the general available water for export?

3 MR. MULLINIX: We are not counting it as part of
4 the water that's necessary from the Bureau's obligation
5 and from the State's obligation to meet Delta water
6 outflow. Does that answer that?

7 It has a very definite advantage from a fisheries
8 standpoint because you do not have as much north-south
9 flow in the Delta, as this New Melones is used. It's
10 not a great amount of water. In fact, the Fishery Agreement
11 requires that water to be put down. In that regard
12 it's not that beneficial from the standpoint of the
13 State Water Project divergence or the Federal.

14 MR. MCDANIEL: Yes?

15 MR. DAVOREN: I don't to be too repetitive on
16 this subject, but how could you have affected the
17 environment of the Delta/Bay estuary, page 42, all the
18 way through consequences, Delta/Bay estuary, page 60,
19 without referring or any discussions of 1485 -- without
20 referring to the without project conditions that 1485
21 and the Delta Plan are based on, and somehow or other
22 referencing the goal of the Striped Bass Index?

23 How could you do this? I mean, it's a great
24 editorial gap if you just look at editorial gaps.

25 MR. WINKLER: I think many of the concerns that

1 you brought up are warranted. Certainly, you can see
2 from the report environmental study and environmental
3 costs were dealt with from the standpoint of implementing
4 the protective standards of the agreement.

5 The subject of striped bass was dealt with as
6 well as any other consequences that was found during
7 the evaluation.

8 The Striped Bass Index for predictive purposes
9 is now under study. It is certainly a valid thing to
10 compute each year. However, since the '76-77 drought
11 Fish and Game and others have warned us about using
12 it for long-term prediction.

13 As far as getting into details about 1485, it's
14 difficult to analyze fully new water rights standards
15 for the entire Delta system when a complete job of that
16 requires weeks of testimony throughout the state.

17 We understand there's many concerns about D-1485
18 and there's many ongoing studies to resolve those, to
19 define them. And as you have mentioned, the Board is
20 also planning to address all of those issues.

21 In the meantime, the COA was aiming at bringing
22 operations a step forward in terms of protecting the
23 Delta by getting the existing standards in place.

24 We can elaborate on some of these subjects in
25 more detail in the final; provide more thinking on them

1 And some of the information which you have brought
2 up on the recent calculations in the Striped Bass Index
3 surely would be valuable information for the final EIR.
4 Its use as a predictive tool, thought, we will have to
5 coordinate closely with the Department of Fish and Game.

6 MR. DAVOREN: Well, it's -- aside from prediction,
7 it's awfully good as an indication of what's gone wrong
8 in the past by following conclusions of certain very
9 strong engineering organizations.

10 Can you, for instance, tell me -- assure me --
11 that there's a biologist, either federal or state, on
12 the team that wrote this?

13 MR. WINKLER: The list of preparers are listed
14 in the report. And, yes, there were. As a matter of
15 fact California Department of Fish and Game, United
16 States Fish and Wildlife Service, did work closely
17 in the preparation of this.

18 And we agree the Striped Bass Index has importance.
19 Also, there's other values to consider and the State
20 Board recognizes that and have put together a complete
21 team of a striped bass working group to just investigate
22 this subject. And they still haven't concluded the exact
23 reason, but they have come up with preliminary conclusions
24 on factors that affect striped bass, and those are listed
25 here and we can elaborate on this in the future in the

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1 final EIS/EIR.

2 MR. MCDANIEL: Bill, you are going to be giving
3 us written comments and we'll be addressing those
4 comments. I doubt we will be able to answer all the
5 questions you might pose here this evening.

6 MR. DAVOREN: I know you can't

7 MR. MULLINIX: Dave, are you going to make a
8 comment?

9 MR. MCDANIEL: Yes, John?

10 MR. DEVITO: Jim, can you give us some indication
11 of when you will come out with the final draft of the
12 EIS/EIR?

13 MR. MCDANIEL: We hope to have it by the end
14 of the year, John. We indicated earlier the public
15 review period is over, when, the 13th of this month

16 MR. WINKLER: Yes.

17 MR. MCDANIEL: It it will give a couple of months
18 to wrap it up.

19 MR. DEVITO: Thank you.

20 MR. MCDANIEL: Well, if there are no further
21 questions, that concludes the meeting. Thank you for
22 coming.

23 --o0o--
24
25

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9/16/84-2/7/87

Statement of
SUPERVISOR TOM THORLAKSON, CONTRA COSTA COUNTY
on the
DRAFT ENVIRONMENTAL IMPACT STATEMENT/REPORT
for the
COORDINATED OPERATIONS AGREEMENT

OCTOBER 22, 1985

This statement transmits preliminary comments of the Contra Costa County Water Agency on the Draft Environmental Impact Statement/Report on the Coordinated Operations Agreement between the Central Valley Project and the State Water Project. The Contra Costa County Water Agency is governed by the Board of Supervisors of Contra Costa County and they have authorized me to make this statement on their behalf.

Contra Costa County Water Agency supports the Coordinated Operations Agreement. The Board of Supervisors has expressed strong support for HR 3113 which would authorize the Bureau of Reclamation to execute the Agreement. However, we do have some concerns about the Draft EIS/EIR.

We are pleased that the federal government has agreed to share responsibility for meeting water quality requirements set by the State Water Resources Control Board. However, we note that the federal obligation is somewhat incomplete because the Bureau of Reclamation has only agreed to meet those standards in Decision 1485. New standards replacing Decision 1485 are expected within a few years. Even with this limitation, the Coordinated Operations Agreement is a step in the right direction.

Our main criticism of the Draft EIS/EIR is the conclusion that if the Coordinated Operations Agreement is executed, the Bay/Delta Estuary would be protected based on Decision 1485 standards. It is clear that Decision 1485 standards has not and cannot protect the estuary. Also, Decision 1485 was rejected by the courts as improperly promulgated. This matter is still under appeal by the courts but, nevertheless, is an indication of the inadequacy of Decision 1485. This is clearly evident in the most recent report on the state of the striped bass fishery. The most recent measurement of the striped bass population shows that the fishery has

declined to an all-time low. This is not acceptable and Decision 1485 must be modified to insure the health of the striped bass and other fish and wildlife in the estuary. Decision 1485 also does not include adequate standards for Suisun Marsh, San Francisco Bay, and the South Delta. These inadequacies should be noted in the Draft EIS/EIR. It is clearly wrong to say that by simply meeting Decision 1485 standards that the Bay/Delta Estuary will be protected.

Additionally, the Draft EIR/EIS should have more information on the effect of diversions due to the two water projects on San Francisco Bay. Information on the effect of return flows from agricultural drainage from the San Joaquin Valley on the estuary should also be included.

The Draft EIS/EIR notes that approximately one million acre-feet of water from the Central Valley Project will be made available for contract. The Draft EIS/EIR should estimate the effect on water quality and fisheries if this water was used to maintain Delta water quality above current Decision 1485 standards, rather than being made available for export out of the Delta.

Contra Costa County will carefully watch the progress of the Coordinated Operations Agreement, including the Congressional legislation currently underway. Contra Costa County is also part of the Bay/Delta Committee for Water Policy Consensus which is also actively watching the progress of the Coordinated Operations Agreement.

We thank you for this opportunity to comment on the Draft EIR/EIS and look forward to the second public hearing to be held in Concord.

THC:l
w.waterlab.stmt.t10

ATTACHMENT *1*

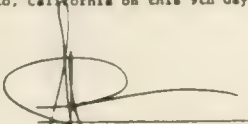
REPORTER'S CERTIFICATE

--000--

STATE OF CALIFORNIA :
 COUNTY OF SACRAMENTO : ss.

I, L. ROB WELLS, certify that I was the Court Reporter present at the heretofore reported proceedings; that I reported in shorthand writing the foregoing public hearing and that I, thereafter, caused my shorthand writing to be reduced to typewriting. The pages numbered 1 through 50, inclusive, constitute a full, true, and correct record of said proceedings.

IN WITNESS WHEREOF, I have subscribed this certificate at Sacramento, California on this 9th day of November 1985.


 L. ROB WELLS
 CAPITOL REPORTERS
 820 Alhambra Boulevard
 Sacramento, California 95816

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STATEMENT OF CONGRESSMAN GEORGE MILLER
 CHAIRMAN, SUBCOMMITTEE ON WATER AND POWER RESOURCES
 U.S. HOUSE OF REPRESENTATIVES

PUBLIC HEARING ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
 ON THE
 COORDINATED OPERATION AGREEMENT
 CONCORD, CALIFORNIA
 NOVEMBER 7, 1985

The draft environmental impact statement which is the subject of this hearing evaluates a critical agreement for the coordinated operation of the Central Valley Project and the State Water Project in California.

This is one of the most important agreements ever developed for the future of water policy in this State, not only for the Delta and the Bay Area, but for all areas of California.

This Coordinated Operations Agreement provides a framework for the management of the state and federal water projects, and it insures that both projects are committed to the protection of Delta water quality.

By guaranteeing Delta water quality, this agreement can help to end the water wars and relieve the legislative paralysis which has long crippled our state. This will benefit all Californians -- North and South, and those in the Central Valley, Southern California and Delta as well.

Because this agreement is so historic and so sweeping, the Congress has carefully reviewed its provisions to assure that it is fiscally responsible, environmentally sound, and administratively feasible. The House of Representatives has already passed my legislation, HR 3113, to mandate protection of water quality in the Delta and to authorize the COA. We are hopeful that the Senate will act on my legislation

within the next few weeks.

I want to note that both our State's Senators, Alan Cranston and Pete Wilson, have endorsed passage of my legislation in its present form. In addition, a wide array of diverse and usually antagonistic interests throughout our state, including the Metropolitan Water District, state and federal contractors, and environmental organizations, agree that HR 3113 is an historic "peace treaty" which should be enacted without delay.

I would like to briefly outline the major provisions of H.R. 3113 for the hearing record. I believe these provisions may be of assistance to you in preparing the final environmental impact statement.

My bill authorizes the Secretary to execute the COA, and directs the Secretary of the Interior to operate the CVP to meet the standards for the Delta and the Bay as established by the State Water Resources Control Board. But my legislation also requires changes in law and in the proposed COA which are essential to assure that its intended purposes are met.

For us in the Delta, whose water quality has deteriorated as a result of the exports of the two projects, the COA and its implementing legislation must provide this assurance: our water quality will not be undermined with the signing of new water delivery contracts, or with the construction of additional units of the CVP. The failure of the Bay and Delta area to have these legitimate demands recognized by state and federal water planners has led to regional conflict and stalemates which have injured all Californians.

My bill mandates that the obligation of the Federal government to meet State water quality standards for the Delta exist independent of the Coordinated Operations Agreement itself, as a separate matter of law. The diversion of water away from the Delta is not dependent

on the COA; the water supply contracts will continue absent a COA.

So, too, must basic protection for the Bay and Delta continue in force, regardless of the future of the COA. We in the Delta cannot have the quality of our water dependent on the whim of state or federal officials. It must be preserved as a matter of law, and that is what my bill does.

The legislation provides an additional safeguard to 350,000 customers of the Contra Costa Water District, whose only source of drinking water is the Delta. My legislation guarantees in federal law that specific water quality standards, at least as good as those contained in the State Board's D-1485, will be maintained at the District's intake at Rock Slough.

The COA allows the Federal Government to enter into contracts for the conveyance and purchase of Central Valley project water. These contracts constitute a significant departure from past practices which ought not be approved only by administrators of the projects, without adequate public review. The Congress must have an opportunity to examine the conformity of these contracts with mandates laid down in federal statutes governing the utilization, sale, and development of federal water. For that reason, my bill requires Congressional approval of these contracts.

Similarly, my bill provides that the Secretary may not terminate the federal government's participation in the COA without first submitting to the Congress a report outlining his reasons for doing so for a period of 180 days during which Congress is in session. We cannot allow a situation where the commitment of the Federal government to protect the Delta rests solely on an agreement which can be abrogated

at the whim of the Secretary of the Interior.

The COA will allow for better planning and coordination, but it obviously cannot prevent shortages that may occur in the amount of project water available to meet contractual commitments and the State water quality standards. When more shortfalls do occur in the future, my bill mandates that the Secretary reduce deliveries to all users in order to first meet Delta water quality standards.

The first responsibility for enduring those reductions will come from agricultural contractors before reductions are imposed on municipal users who lack available alternative sources of water for essential human health and safety needs.

Just as policy must come before plumbing, people must come before plants. This is the basis upon which the project has been operated in the past, with the cooperation of all parties, and it is a sound basis for future operations as well.

My legislation also requires that water sold under future contracts must be recallable to meet State water quality standards for the Delta and Bay, should they be upgraded in the future. Surplus water will remain available for sale. But water which is needed to meet lawfully established Bay-Delta water quality standards is not "surplus," and must be available through this recall mechanism to meet this fundamental purpose.

The Environmental Impact Statement reaffirms the commitment to Delta water quality which is the central tenet of my legislation and the COA itself.

In fact, the EIS implicitly concludes that if we fail to ratify this historic agreement, water supplies throughout the State, and

water quality here in the Delta, will undoubtedly suffer.

If we fail to act, The EIS notes, salinity in Delta channels could imperil not only our drinking water supplies, but the farming and industrial activities which provide thousands of jobs and which promote the economic vitality of the entire Bay Area, and other areas of the State as well. Under the "No Action" option, salinity, TDMs and other contaminants would jeopardize the water supply of hundreds of thousands of Contra Costans and others in this area. That "no action" option is an option we cannot afford.

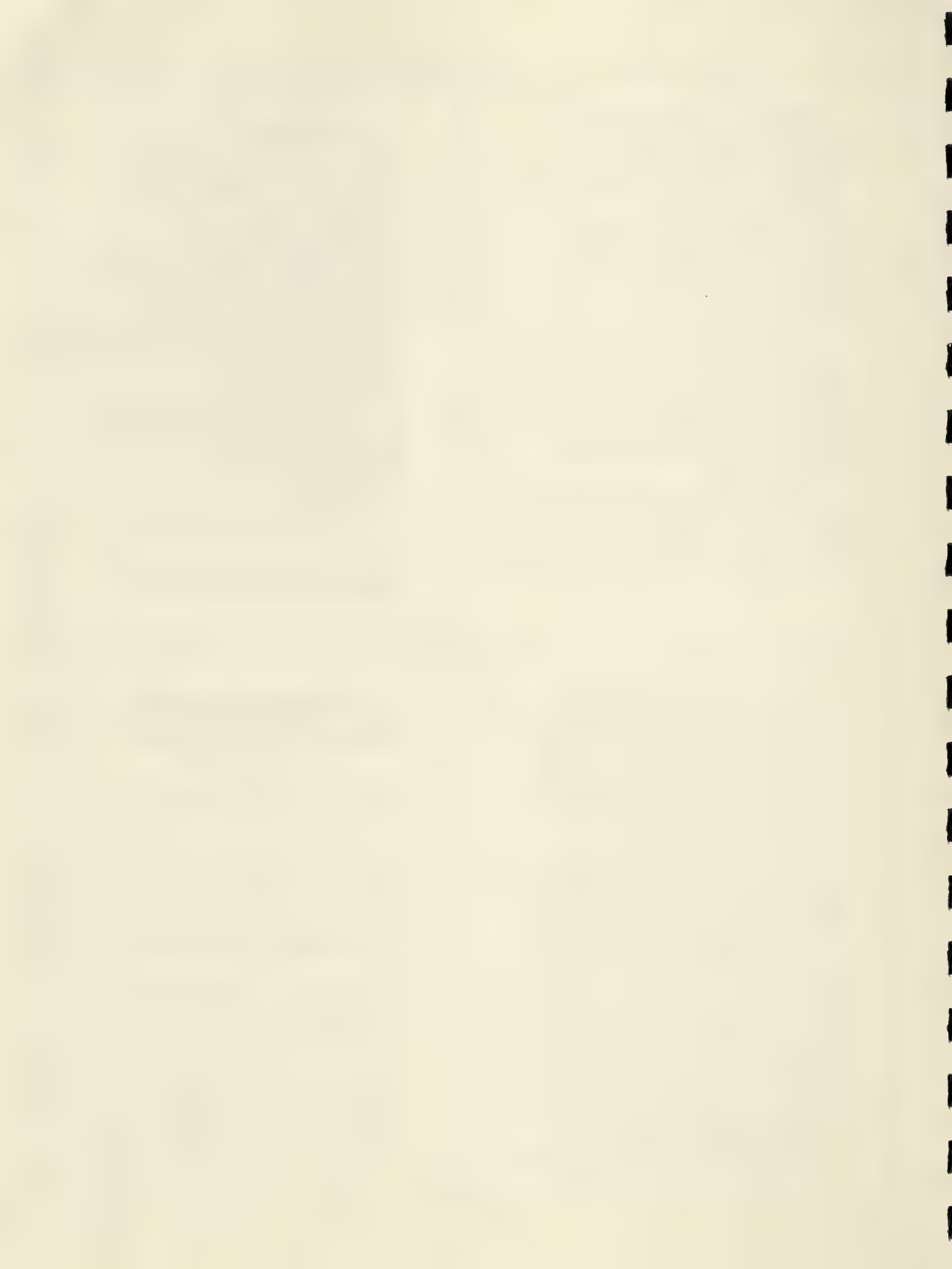
We have already seen the evidence of what "no action" will produce. Bass and other fish populations have been decimated, and we have no assurance that drinking water supplies will not grow worse. We cannot live with that uncertainty in this county and that is why the COA, and HR 3113, are urgently needed.

The COA will not solve every water policy problem facing California. The selenium crisis at Kesterson Reservoir, which is the direct product of irrigation practices, illustrates how serious and unpredictable future challenges will be.

The trust and cooperation which has produced the consensus behind HR 3113 and the COA will be essential if we are to avoid falling back into the suspicion and regional division which has long characterized water policy in this state. The COA and HR 3113 are lessons for us all in the right way to make policy decisions on water issues: in the open, with full public participation and review, and with a commitment to those goals which serve best the state as a whole.

The time has come to move forward to end the suspicion and stagnation which has impeded sound water policy in this state for too long.

The COA and H.R. 3113 provides the framework for accomplishing that goal. I urge the Bureau of Reclamation and the State of California to proceed with their approval processes for this document.



Section 4. DRAFT EIR/EIS



DRAFT

**Environmental Impact Statement/Report
Coordinated Operation Agreement**

Central Valley Project/State Water Project

Donald Hodel
Secretary of Interior
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David Houston
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Secretary for Resources
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George Deukmejian
Governor
State of California

David N. Kennedy
Director
Department of Water Resources



JOINT ENVIRONMENTAL IMPACT STATEMENT
AND ENVIRONMENTAL IMPACT REPORT

PROPOSED AGREEMENT BETWEEN THE
UNITED STATES OF AMERICA
AND THE
DEPARTMENT OF WATER RESOURCES OF THE
STATE OF CALIFORNIA

FOR COORDINATED OPERATION OF THE
CENTRAL VALLEY PROJECT
AND THE
STATE WATER PROJECT

July 1985



Donald Hodel
Secretary of Interior
Department of Interior

David Houston
Regional Director
Mid-Pacific Region
Bureau of Reclamation

Gordon K. Van Vleck
Secretary for Resources
The Resources
Agency

George Deukmejian
Governor
State of California

David N. Kennedy
Director
Department of
Water Resources



JOINT ENVIRONMENTAL IMPACT STATEMENT
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FOR COORDINATED OPERATION OF THE
CENTRAL VALLEY PROJECT
AND THE
STATE WATER PROJECT

Responsible Agencies

U. S. Department of Interior
Bureau of Reclamation and
California Department of Water Resources

Status: DRAFT

Statement number: _____

Filing date: _____

Comments must be received by: _____

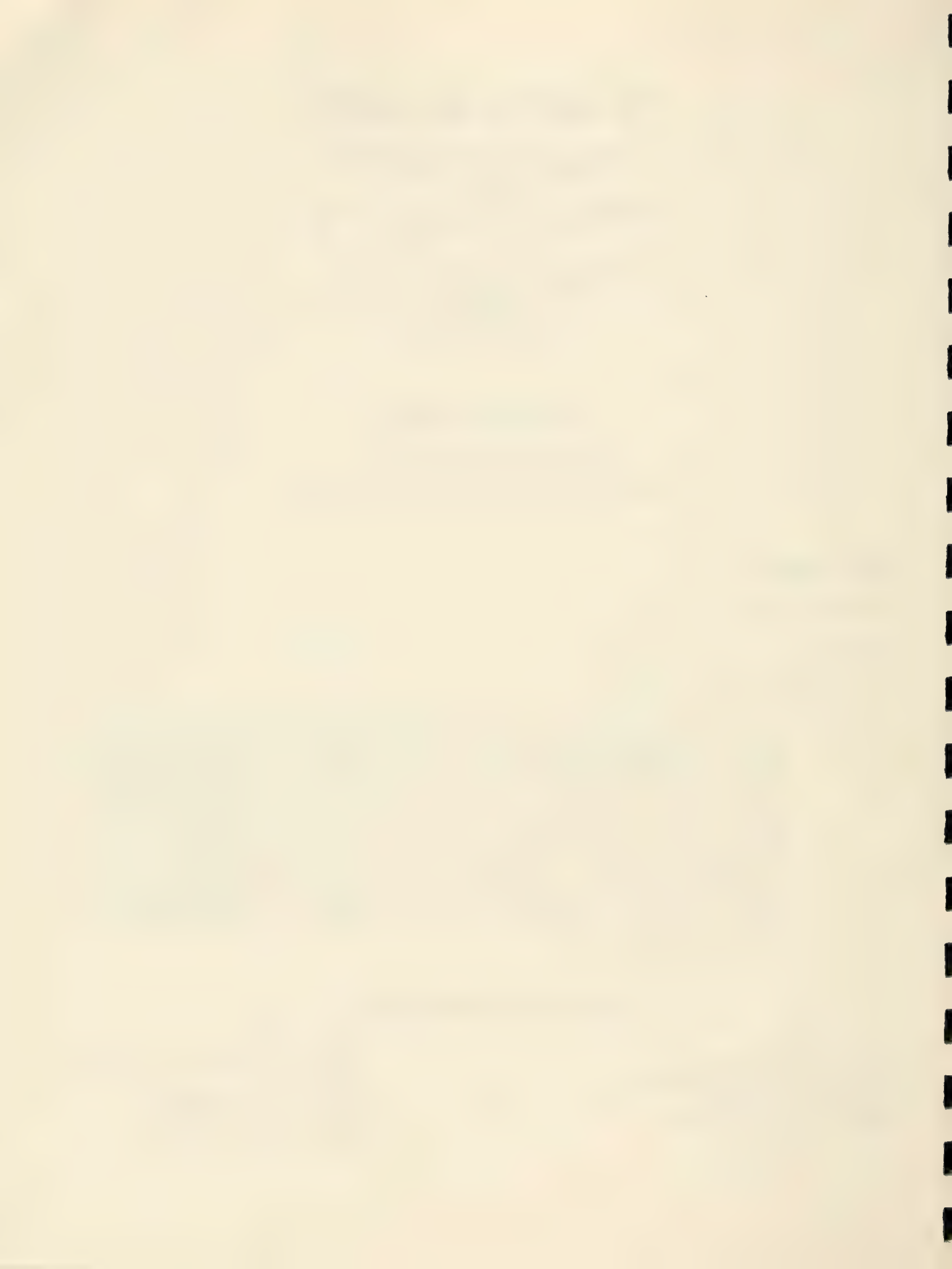
Abstract: The Proposed Action of signing and implementing the draft Coordinated Operation Agreement obligates both the Central Valley Project and the State Water Project to meet water quality and outflow standards extracted from the State Water Resources Control Board Decision 1485 designed for protecting the beneficial uses of the Sacramento-San Joaquin Delta water supply. Without this Agreement (No Action), the Central Valley Project's participation in meeting these standards would not be assured in critically dry years. As compared to No Action, the Proposed Action would have beneficial environmental impacts in the Delta and could have adverse impacts on salmon spawning and rearing in the upper Sacramento and Trinity rivers, depending on how the two water projects would be operated in No Action.

For Further Information Contact

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SUMMARY

The California Department of Water Resources and the U. S. Bureau of Reclamation propose to enter into a new Coordinated Operation Agreement for the State Water Project (SWP) and the Federal Central Valley Project (CVP). Before executing the proposed Agreement, the two agencies have prepared this joint environmental document to comply with State and Federal environmental protection laws.

This report evaluates the environmental consequences of the Proposed Action of signing and implementing the draft Coordinated Operation Agreement of May 20, 1985, as compared to the consequences of No Action; i.e., not signing and implementing the proposed Agreement. "Modified Agreement" alternatives, involving hypothetical agreements or agreement terms not included in the Proposed Action, are discussed. A "No Coordination" alternative is briefly discussed also.

The Bureau of Reclamation and the Department of Water Resources conclude that the Proposed Action is their preferred alternative -- preferred because it would provide a reliable and mutually acceptable basis for coordinating the operations of the Central Valley Project and the State Water Project while protecting the water-related environment in the Sacramento-San Joaquin Delta.

The Proposed Action could reduce the capability of the Central Valley Project operators to control water temperatures for salmon spawning and rearing in the upper Sacramento and Trinity rivers in the driest years. However, similar temperature control problems would be likely to exist without the Proposed Action.

Purpose and Need for Action

The SWP and CVP simultaneously use the same channels of the Sacramento River and the Delta to convey water, and they draw upon a common water supply in the Delta. The purpose of the proposed Agreement is to assure that each project obtains its share of water from the Delta and bears its share of obligations to protect other beneficial uses of water in the Delta and the Sacramento Valley. Coordinated operation by agreed-upon criteria can increase the efficiency of both projects.

Agencies served by the CVP or SWP rely on the project that serves them to deliver dependable water supplies under their contracts with the Bureau or the Department. A coordinated operation agreement facilitates more accurate estimates of how much water each project can deliver.

The first Coordinated Operation Agreement preceded construction of the State Water Project. It is known by the date of its signing, May 16, 1960, and it remains today as the basic coordination document. This original agreement was proposed to be supplemented in 1971 by an agreement that was drafted, but never executed. The 1971 draft agreement was adopted on a year-by-year basis, with modifications, until 1983 (with the exception of 1976). After 1978, the major modification was to recognize the Decision 1485 water quality standards of the State Water Resources Control Board. The year 1983 was so wet that no coordination agreement was necessary. In 1984, a 1982 draft of the currently proposed Coordinated Operation Agreement was used to coordinate project operations.

Execution of the proposed Coordinated Operation Agreement would suspend the 1960 agreement, and year-to-year agreements would no longer be used.

Description of the Proposed Action

The Proposed Action is execution of the draft agreement included as Appendix A of this report. This section describes what the Agreement would accomplish.

The essence of coordinated operations is the sharing formula, not the water supply figures in Exhibit B-1. The projects are not to be operated to meet predetermined yields, but rather to first meet the needs in the areas of origin, including the Delta water quality standards and flow requirements contained in Exhibit A. Only then is water exported from the Delta. The Coordinated Operation Agreement does not affect the rights of third parties (Article 18).

The sharing formula provides for CVP/SWP proportionate split of 75/25 responsibility for meeting in-basin use from stored water releases and 55/45 for capture of excess flow. The formula was arrived at by reasoning, trial and error, and negotiation.

The basic points included in the Agreement are:

1. Both parties agree to meet a specified set of water quality standards (Exhibit A) from State Water Resources Control Board Decision 1485. Article 11 also requires that Exhibit A shall be amended to include any new Delta standards that are not inconsistent with Congressional directives. However, if the Secretary of the Interior determines that new standards are inconsistent with Congressional directives, the Secretary is to promptly request the Department of Justice to bring an action to determine the applicability of the new Delta standards to the United States.

This has been the most difficult area of the agreement. During the long negotiations, it was realized that there is no other way to deal with possible changes in the water quality standards than to leave it up to the courts under existing law. In 1978, the U. S. Supreme Court ruled in California v. U.S. that the State Water Resources Control Board may impose conditions on the Central Valley Project that are not inconsistent with Congressional directives respecting the project. Therefore, the Agreement is neutral on this legal issue. The disclaimer paragraph in Article 11(d) is designed to assure this neutrality.

The standards do not presently include permanent Suisun Marsh criteria, but the Coordinated Operation Agreement does contain a methodology (Articles 11 and 14) for incorporating the Suisun Marsh criteria as they become effective under the Suisun Marsh contract being negotiated among the Department, Bureau of Reclamation, California Department of Fish and Game, and Suisun Resources Conservation District. The parties are nearing agreement. Congressional authorization and funding will be necessary for Federal participation. The State Water Resources Control Board will be asked to endorse the Suisun Marsh standards in the agreement.

2. Each project's annual supplies at the 1980 level of development have been established: 6.9 million acre-feet (MAF) for the CVP and 3.6 MAF for the SWP (includes 1.0 MAF for Feather River service area). Annual supplies at the 2020 level of development would be 8.4 MAF for the CVP and 3.1 MAF for the SWP (includes 1.0 MAF for Feather River service area).

3. The Agreement provides for each party's use of the other's facilities for both short- and long-term situations. In accordance with requirements of Decision 1485, it provides for conveyance of Central Valley Project water through the California Aqueduct to San Luis Reservoir to make up for the

curtailment of pumping during the striped bass spawning period.

Section 10(h) calls for a contract to be concluded by December 31, 1988, for the purchase of interim CVP water by the SWP and the conveyance of CVP water to Federal contractors through the California Aqueduct. The Central Valley Project will have priority equal to that of the State Water Contractors for use of the California Aqueduct for an amount of water equal to the amount purchased by the State from the CVP. In addition, the State is committed to providing conveyance service to the CVP for additional CVP water so long as such conveyance does not diminish deliveries or increase costs of water supplies to the State Water Project contractors. If both parties fail to reach agreement on such a purchase and conveyance agreement, then this Coordinated Operation Agreement may be terminated by either party (Article 14(b)).

Finally, the Agreement calls for periodic review to determine the success of each party toward meeting its objectives and to make adjustments if necessary to enable the party to develop its respective water supplies (Article 14).

The Agreement fairly protects the interests of both projects while meeting responsibilities to protect the water-related environment.

Alternatives

Four alternatives were considered: the Proposed Action, No Action, Modified Agreement, and No Coordination.

Alternative 1, The Proposed Action

Under the Proposed Action, the CVP and SWP would continue to operate as they have in recent years, although using the

new formula for sharing unstored flow that was not used prior to 1984. The new sharing formula does not result in physically observable changes. The Delta water quality (salinity) and outflow standards of the Agreement's Exhibit A would be binding on both projects in all years.

Alternative 2, No Action

In the absence of the Proposed Action, CVP and SWP operating procedures are uncertain. The projects might be operated exactly as they would in the Proposed Action, but under current Bureau policy, CVP compliance with the Delta standards established by or acceptable to the State is not guaranteed in critical (extremely dry) years. If it did not recognize an obligation to meet such standards, the Bureau would still have to guarantee water quality in the Delta sufficient to meet its contractual obligation to users of the Delta-Mendota Canal. The Delta-Mendota Canal contracts contain water quality requirements known as the "Tracy standards". Meeting only the Tracy standards would not provide water quality conditions in the Delta as good as those prescribed by Exhibit A.

If the Bureau operated only for its Tracy standards in critical years, the SWP would still have to be operated in accordance with the State Water Resources Control Board's Delta standards. Meeting these standards without help from the CVP would strain the capabilities of the SWP, and the Department could approach the Board with a petition for relief. Hypothetically, the outcomes of such a petition could range from no relief to full relaxation of the standards, such that the Bureau's Tracy standards would control. Hence, three cases of the No Action alternative are postulated for critical years:

Case A -- Both the CVP and the SWP are operated to meet only the CVP's Tracy standards in the Delta.

Case B -- The CVP is operated to meet Tracy standards, while the SWP is operated to make the same contribution of water for the Delta as it would in the Proposed Action.

Case C -- The CVP is operated to meet Tracy standards and the SWP is operated to fully meet the Exhibit A standards, contributing all the extra water required, including that which would be the CVP share in the Proposed Action.

For years other than critical water supply conditions, it is assumed in all cases of the No Action alternative that the CVP and the SWP would be operated to meet the Exhibit A Delta standards.

Alternative 3, Modified Agreement

Three categories of modification were considered: modifications within the present scope of the Agreement, modifications that would broaden the scope, and modifications that would narrow the scope. Even though these categories can generate numerous other modified agreements, any of the modified agreements would have an overall environmental benefit and would differ only by degrees of benefit.

In the category of modifications within the present scope, the following modifications were considered:

- ° Changing the sharing formulas.
- ° Including the post-1984 Suisun Marsh standards in Exhibit A.

In the category of modifications that would broaden the scope, the following modifications were considered:

- ° A U. S. Fish and Wildlife Service proposal to include fish protection language in the Agreement.

- ° Merging a Delta-Bay Estuary Fish and Wildlife Agreement with the proposed Coordinated Operation Agreement.

In the category of modifications that would narrow the scope, the following modification was considered:

- ° Deleting from the Agreement Article 10(h), which requires the parties to negotiate toward a subsequent agreement dealing with water purchases and additional wheeling arrangements.

Alternative 4, No Coordination

This alternative is not necessarily independent of the No Action alternative, but it represents a No Action scenario that is not considered in the analysis of the No Action alternative.

In No Coordination, the Central Valley Project and State Water Project would not coordinate operations and would not necessarily recognize the same Delta water quality standards at any time. Without coordination, the project operators would not know how much water to contribute to and withdraw from the common pool in the Sacramento-San Joaquin Delta without affecting the beneficial uses of the Delta water supply or the yield of the other project.

Environmental Consequences, Proposed Action versus No Action

Environmental consequences were considered as the differences between the environmental conditions that would be expected to exist with the alternatives of Proposed Action and No Action. To meet the protective criteria of Exhibit A could require project operational changes. Any change could have an effect; however, in all cases the overall environmental protection to the resources with the standards exceeds those of any of the proposed alternative actions.

Delta-Bay Estuary

The Proposed Action would have no adverse environmental effects in the Delta-Bay estuary, compared to No Action, except that peak Delta outflows could be slightly lessened in the winter or spring of the year or years immediately following critical years. The lessening would occur only if higher carryover storage were maintained in CVP reservoirs with No Action, and any lessening that occurred would be too small to make a noticeable environmental difference in the estuary.

No Action, Case A, would have the following adverse effects in the Delta-Bay estuary, as compared to the Proposed Action:

- ° High salinity in irrigation water taken from channels of the western Delta could adversely affect crops during critical years.
- ° During critical years, the concentration of total dissolved solids at the intake of the Contra Costa Canal would occasionally exceed the maximum recommended by the Environmental Protection Agency for drinking water. The EPA's recommended maximum concentration of chloride in drinking water would also be exceeded occasionally during critical years.
- ° The potential for formation of trihalomethanes (suspected carcinogens), in the Contra Costa Canal drinking water supply would increase during critical years.
- ° Industrial plants in eastern Contra Costa County that make paper and cardboard would incur higher costs and experience capacity limitations due to excessive salinity of their Contra Costa Canal water supply during critical years.
- ° Salinity in the lower San Joaquin River during the striped bass spawning season of critical years would exceed

the levels at which striped bass prefer to spawn.

- ° Delta outflow in July, August, and September of critical years would be insufficient to maintain the entrapment zone in the Suisun Bay area. Resulting decreases in Neomysis and young striped bass abundance would be expected.
- ° Detrimental reverse flows in the lower San Joaquin River would increase during critical years. This would increase the number of juvenile salmon drawn to the export pumps from the Sacramento River.
- ° April, May, and June flows in the Sacramento River would be lower during critical years, reducing the survival rate for juvenile salmon migrating down the river.
- ° Alkali bulrush seed production in Suisun Marsh would decline during critical years, reducing the waterfowl holding capacity of the marsh.

Effects in the Delta-Bay estuary of No Action, Case B, would be intermediate between those of No Action, Case A, and those of the Proposed Action. Effects of No Action, Case C, would be similar to those of the Proposed Action.

State Water Project Service Areas

The Proposed Action would have no adverse effects on the State Water Project service areas.

Effects of the No Action alternative, as compared to the Proposed Action, vary according to the case being considered. In No Action, Case A, the State Water Project service areas would experience a reduction in the quality of their SWP water supply. The reduction would not be significant enough to affect use of the water. In Case B, there would be a similar, but lesser, reduction in

quality. In Case C, there would be a reduction in State Water Project deliveries: firm yield of the project would be reduced by up to 143,000 acre-feet.

Central Valley Project Service Areas

The Proposed Action would commit a portion of the Central Valley Project's water supply to meeting Delta water quality and outflow standards equivalent to Decision 1485 in critical years, as well as all other years. Operation studies indicate that the amount of water supply so committed, above that required to meet the Decision 1485 standards in non-critical years and the Tracy standards in critical years, would be equal to 717,000 acre-feet over the 7-year critical period 1928 to 1934, or about 100,000 acre-feet annually. The same water conceivably could be committed to some other use, such as supplying Central Valley Project service areas. Thus, an effect of the Proposed Action is to deny Central Valley Project service areas, existing and potential, use of the amount of CVP water supply committed under the Agreement to meeting the Delta water quality and outflow standards of Exhibit A during critical years.

Adverse effects of the No Action alternative on CVP customers, as compared to what they would experience under the Proposed Action, would consist of reductions in the quality of water pumped into Contra Costa Canal (discussed earlier under "Delta-Bay Estuary") and reductions in the quality of water pumped into the Delta-Mendota Canal by the Tracy Pumping Plant during critical years. The reduction in quality of the Delta-Mendota Canal water would be greatest in Case A, but water quality would still be within the range allowed by the contracts and not enough different, as compared to quality with the Proposed Action, to require a change in use.

Rivers and Reservoirs

Because the Proposed Action would commit a greater amount of CVP water to Delta use and outflow than the CVP might otherwise release for this purpose in critical years, critical-year water levels in CVP reservoirs under the Proposed Action could be lower than they might be under the No Action alternative. Critical years occur less than 10 percent of the time, and operations during other year types would not significantly affect storage changes. Lower reservoir levels at Shasta, Clair Engle, and Folsom lakes could occur according to the operating assumptions used in this report and might adversely affect esthetics and recreation at those lakes. Water temperatures could be increased by as much as 4 degrees Fahrenheit in the Sacramento and Trinity rivers at certain times during critical years. Other operating alternatives would have less effect. Temperature effects of increased drawdown were identified in only 3 of 83 years studied, which represents less than a 4 percent probability of occurrence. Since temperature would in any case be marginal during these times for survival of salmon eggs and alevins (fry with yolk sac still attached), a small increase in temperature could have negative effects. Temperature changes in the American River attributable to lower reservoir storage levels would be less pronounced than in the Sacramento and Trinity rivers.

It should be recognized, however, that salmon impacts discussed above are local effects and may not occur under operating assumptions different from those used in the alternatives, yet are still possible in the future. Inherent in this Agreement is the commitment by both the CVP and SWP to meet an adopted set of standards designed to protect salmon (and other resources) and that meeting these standards is judged more beneficial to salmon overall than if these standards are not met.

The temperature impacts of the Proposed Action arise only by comparison to the No Action cases, and then only if it is assumed in the No Action cases that the CVP retains in storage the increment of project water it could save by meeting the Tracy standards in critical years rather than the Exhibit A standards.

Retention in the reservoirs represents only one possibility. Another possibility is that the water would be delivered to CVP contractors. If the water were delivered to contractors rather than retained in the reservoirs, the environmental consequences of No Action would become more like those of the Proposed Action as far as rivers and reservoirs are concerned.

Preferred Alternative

Relative advantages and disadvantages of the alternatives are compared in Table S-1.

The Proposed Action is the alternative preferred by the Bureau of Reclamation and the Department of Water Resources. This alternative is preferred because it would fulfill the need for a Coordinated Operation Agreement, described above under "Purpose and Need", and because it would provide greater protection to the water-related environment in the Sacramento-San Joaquin Delta than would the alternative of No Action. Such protection would come at the expense of diminishing the Central Valley Project's potential capability (not necessarily its actual capability) to control river temperatures for salmon spawning below its major reservoirs during critical years.

None of the Modified Agreement alternatives was found acceptable to the reasoning and trial and error process of negotiations. The No Coordination alternative is not preferred because it could have serious adverse effects on both projects and the environment.

Mitigation Measures

Diminution of the CVP's potential capability to control water temperatures for salmon spawning in the rivers below its major reservoirs during critical years could be an adverse environmental effect, but this could be mitigated by the overall protective standards for salmon in Exhibit A. These standards are designed to mitigate for impacts to the salmon (and other) resources, and meeting these standards is judged more beneficial to this resource than not meeting these standards.

Temperature control for fish protection in the Sacramento and Trinity rivers is a recognized concern in the operation of the CVP and is the subject of ongoing studies. The concern exists with or without the Proposed Action, and the Proposed Action would not necessarily make it any worse. Further studies and actions will provide added mitigation.

Cumulative Impacts

The proposed Agreement could be considered a link in a chain of events that could lead to other actions that could have significant environmental impacts. However, future actions beyond this Agreement would be necessary and would require environmental documentation and mitigation.

Article 10(h) of the proposed Agreement requires the parties to negotiate a subsequent agreement that would expand the wheeling services the SWP provides to the CVP and commit the Bureau of Reclamation to sell CVP water to the SWP. An effect of a wheeling and water purchase agreement would be to increase the amount of water the two projects export from the Sacramento-San Joaquin Delta.

A moratorium on new CVP water service contracts has been in effect since 1979. The moratorium was imposed administra-

tively by the Secretary of the Interior. The terms of the moratorium provide that it will be lifted when the responsibilities of the CVP toward water quality protection in the Delta have been clarified and the Bureau has committed itself to meet those responsibilities.

After the proposed Agreement is executed, the Bureau intends to ask the Secretary of the Interior to lift the moratorium, thus allowing the Bureau to enter into negotiations for possible contracts for development of the uncommitted water supply of the CVP. This uncommitted supply is estimated at about one million acre-feet annually. Potential customers for the million acre-feet include the SWP and irrigators in the Sacramento and San Joaquin valleys.

Prior to execution of any long-term CVP water service contracts or wheeling agreements with the State, appropriate environmental analysis and documentation

will be conducted pursuant to NEPA and CEQA, including an analysis of cumulative effects.

Mitigation for cumulative impacts such as may be associated with the Proposed Action is woven into the fabric of laws that protect the environment, such as California Environmental Quality Act and National Environmental Policy Act, and is carried out through actions of government agencies, particularly those having regulatory powers. Mitigation can also be provided through contracts and physical measures. Studies to mitigate for future project cumulative effects are also being conducted, including several million dollars allocated to monitoring and ecological studies. Appropriate mitigation for impacts of the continuing development of the CVP and SWP will be devised when specific projects are proposed and their impacts identified in other environmental documentation.

Table S-1

RELATIVE ADVANTAGES AND DISADVANTAGES OF REASONABLE ALTERNATIVES

Alternatives	Advantages	Disadvantages*
Proposed Action (Compared to No Action)	Better overall protection for migratory fish in the Delta during critically dry years. Higher potential agricultural productivity in the western Delta during critically dry years. Higher productivity of waterfowl food in Suisun Marsh during critically dry years. Higher water quality for M&I use in the Delta during critically dry years.	Potential for increased drawdown at CVP reservoirs during critically dry years, with minor adverse effects on esthetics and recreation. Potential local adverse effects on salmon spawning and rearing due to high river temperatures during late summer and fall months of critically dry years. Potential for slightly reduced Delta outflow peaks in the year or years immediately following critically dry years.
No Action, Case A ** (Compared to Proposed Action)	Retains existing CVP option to reserve portion of water stored in reservoirs for maintaining river temperatures suitable for salmon spawning in late summer and fall of critically dry years. Disadvantages of Proposed Action avoided if water saved by meeting less demanding Delta standards is retained in storage.	Advantages of Proposed Action foregone.
No Action, Case B ** (Compared to Proposed Action)	Same as Case A	Advantages of Proposed Action foregone, but to a lesser degree than in Case A.
No Action, Case C ** (Compared to Proposed Action)	Same as Proposed Action	Firm water supply yield of SWP reduced by 143,000 acre-feet.
Modified Agreement (Compared to Proposed Action)	Potential for increased flexibility.	Modifications were not found to be acceptable to the reasoning and trial and error negotiations.
No Coordination (Compared to Proposed Action)	None	Decrease in environmental protection and in reliability of project yields.

* No impacts were judged to be significant based on CEQA criteria listed in Appendix K.

**Case A = CVP and SWP meet Tracy standards.

Case B = CVP meets Tracy standards; SWP releases its share of Exhibit A.

Case C = CVP meets Tracy standards; SWP meets Exhibit A in full.



Chapter 1. PURPOSE AND NEED FOR ACTION

A Coordinated Operation Agreement is a requirement for orderly and efficient functioning of California's two largest water resources development projects: the Federal Central Valley Project and the California State Water Project. The two projects are operated as separate entities by the U. S. Bureau of Reclamation and the California Department of Water Resources, but their operations are interrelated, their waters are mingled, and their effects on the environment occur jointly in many instances.

The purpose of the proposed Agreement is to assure that each project obtains its share of water from the Delta and bears its share of obligations to protect other beneficial uses of water in the Delta and the Sacramento Valley. Coordinated operation by agreed-upon criteria can increase the efficiency of both projects.

Central Valley Project, History and Purpose

During the 1920s, a period of rapid growth in California, the State's political leaders recognized a need for large-scale water resources development to meet growing needs for flood protection and water supply. The Legislature in 1921 authorized a statewide water resources investigation, which 10 years later produced the State Water Plan. The plan contemplated transfer of surplus water between the northern and southern portions of the Central Valley in a State Central Valley Project. This

project, the initial feature of the State Water Plan, was approved, first by the Legislature and then by the voters of California. But the nation was in the depths of the Great Depression, and the bonds needed to finance the project could not be sold. Arrangements were subsequently made for Federal authorization and financing.

Federal legislation authorizing the Central Valley Project in 1937 declared that its facilities "shall be used first for river regulation, navigation and flood control; second for irrigation and domestic uses; and third for power." Salinity control in the Delta was not specifically listed as a project purpose. The salinity control responsibility of the Central Valley Project, if any, has been a subject of long-standing controversy.*

Major facilities of the Central Valley Project are shown in Figure 1. These facilities primarily serve to regulate, store, or divert flows of the Trinity, Sacramento, American, Stanislaus, and San Joaquin rivers, all of which are tributary (by way of a diversion tunnel, in the case of the Trinity) to the Sacramento-San Joaquin Delta. The Central Valley Project pumps water from the Delta and exports it to the San Joaquin Valley via the Delta-Mendota and San Luis canals and to Contra Costa County via the Contra Costa Canal. The CVP also diverts and delivers water upstream from the Delta with facilities that include the Tehama-Colusa, Corning, Folsom South, Madera, and Friant-Kern canals.

*This controversy is chronicled by W. Turrentine Jackson and Alan M. Patterson in The Sacramento-San Joaquin Delta, the Evolution and Implementation of Water Policy, Department of History, University of California, Davis; Water Resources Center Contribution No. 163, June 1977.

The first unit of the Central Valley Project, the Contra Costa Canal, became operational in 1940, and many key facilities, such as Shasta Dam and the Delta-Mendota Canal, were operational by the early 1950s.

State Water Project, History and Purpose

Leaders of the California Government did not necessarily intend that the Central Valley Project remain Federal. At least some of them intended and believed that it would eventually become a State project, as was contemplated in the State Water Plan. As time passed, it became clear that institutional obstacles would complicate, and perhaps preclude, transfer of the Central Valley Project from Federal to State control /1/*. Meanwhile, the growth of California accelerated, particularly after World War II, and State officials perceived a need for a water resources development system of far greater extent than was encompassed by the Federal Central Valley Project.

By 1951, State water planners were outlining the fundamental elements of what would become the State Water Project. Some important milestones in development of the State Water Project were approval of the California Water Resources Development Bond Act in 1960, the beginning of construction of Oroville Dam in 1962, and the initial operation of the California Aqueduct in 1968.

The State Water Project has contracts, most of them made in the early 1960s, calling for eventual delivery of 4.2 million acre-feet of firm annual yield. These contracts are with 27 public agencies in the San Joaquin Valley, the San Francisco Bay area, and Southern California. The project also has three contracts with public agencies in the

upper Feather River area totaling 39,800 acre-feet as a maximum entitlement.

Before serving these water contractors, the State Water Project must meet the prior rights of water users from the Feather River below Oroville Dam. Agreements between the State and most of the users have been signed. These agreements specify the value of appropriate water rights in acre-feet per year and the acreage covered by riparian water rights. Annual draft on Feather River flow identified in these agreements is about 1 million acre-feet.

Besides these contractual obligations and agreements for water supply, the State Water Project is required by law to provide salinity control in the Delta. Recreation and fish and wildlife enhancement are also among the project's authorized purposes.

The major facilities of the State Water Project are shown in Figure 1. Constructed mainly in the 1960s and early 1970s, they serve to regulate, store, and divert flows of the Feather River, a major tributary to the Sacramento River, and to export water from the Delta. The SWP delivers water pumped from the Delta to the southern San Joaquin Valley and Southern California via the California Aqueduct and to parts of the San Francisco Bay area via the South Bay Aqueduct. The estimated yield obtainable with existing SWP facilities when the contracts fully mature is about half of the amount the contracts require.

Development of Prior Coordinated Operation Agreements

Even before the State Water Project began operating, State and Federal officials realized that understandings would be needed to coordinate its

* See numbered references at the end of the report.

**Figure 1: MAJOR FEATURES
OF THE SWP AND CVP**



operations with those of the Central Valley Project. Accordingly, an agreement was signed on May 16, 1960, to:

- ° Provide a method of allocating shortages in water supplies by prorating the shortage on the basis of specified annual diversion amounts.
- ° Resolve the protests of each party to the applications of the other for water rights consistent with these annual diversion amounts.

Although the 1960 agreement provides for coordinated operations, Article 16 specifically recognized that additional criteria would be needed to actually operate the two projects on a coordinated basis. Negotiations on the operating criteria culminated in the draft Coordinated Operation Agreement of May 13, 1971. That draft agreement provided a procedure whereby the operators of the Central Valley Project and State Water Project would determine how much water each project must supply from its own sources for uses in the Sacramento Valley, including the Delta, and how much water each project is entitled to export from the Delta.

Taking the agreed-upon obligations and entitlements of the draft agreement into account, mathematical simulations of project operations were used to calculate the annual water supply of each project. Annual water supply is the amount of water that can be delivered in all years except during critically dry periods, when deficiencies are allowed so long as they are within the deficiency provisions of the water supply contracts. The simulations done for the 1971 draft agreement assumed completion and operation of Auburn Reservoir and construction of a Delta water transfer facility such as the Peripheral Canal. The calculated annual water supplies from the simulations were 9.25 million acre-feet for the Central Valley Project and 3.78 million acre-feet for the State Water Project.

The 1971 draft agreement was never executed, because the Environmental Defense Fund filed a lawsuit that resulted in an agreement by the Bureau not to execute the 1971 draft until an environmental document was prepared in accordance with the National Environmental Policy Act /2/.

From 1971 through 1982, the Bureau of Reclamation and Department of Water Resources operated the CVP and SWP in a coordinated manner through annual letters of understanding in which they agreed to operate according to the terms of the 1971 draft agreement, with modifications. An exception occurred in 1976, a drought year, when there was no letter of understanding and the CVP did not release what the Department considered the CVP's fair share of Delta salinity control and outflow requirements.

From 1979 through 1982, the annual letter included an agreement by the Bureau to operate the CVP in compliance with the Decision 1485 (August 1978) water quality and outflow standards of the State Water Resources Control Board. In 1983, so much water was available in the Delta that no coordination agreement was necessary. In 1984, the project operators informally agreed to operate in accordance with the sharing formula of the draft Agreement that is the subject of this report.

Development of the Proposed Coordinated Operation Agreement

By 1979, a need to renegotiate the 1971 draft agreement had become apparent. The changed circumstances that necessitated renegotiation were related to data gathered during the 1976-77 drought, the State Water Resources Control Board's Decision 1485, the Secretary of the Interior's decision to voluntarily meet certain Delta water quality standards stated in Decision 1485, and the fact that not all of the facilities described

in the 1971 draft agreement had been constructed.

In 1979, the Bureau and the Department formed negotiating teams to reevaluate operating criteria, determine the water supplies available for each project, and develop a new operation agreement. New simulations were performed and refined, eventually becoming the basis for Exhibits B-1 and B-2 of the proposed Agreement and for the sharing formula, which derives from Exhibit B-1. In December 1982, after about 25 public negotiating sessions, the negotiating teams completed a draft agreement and forwarded it to the Director of Water Resources and the Regional Director of the Bureau of Reclamation for approval. That draft agreement was never approved. Negotiations were reopened in July 1984 at the request of the Bureau of Reclamation. Eight additional public negotiation sessions were held, resulting in concurrence on the draft agreement that is the subject of this report on May 20, 1985.

Need for Action

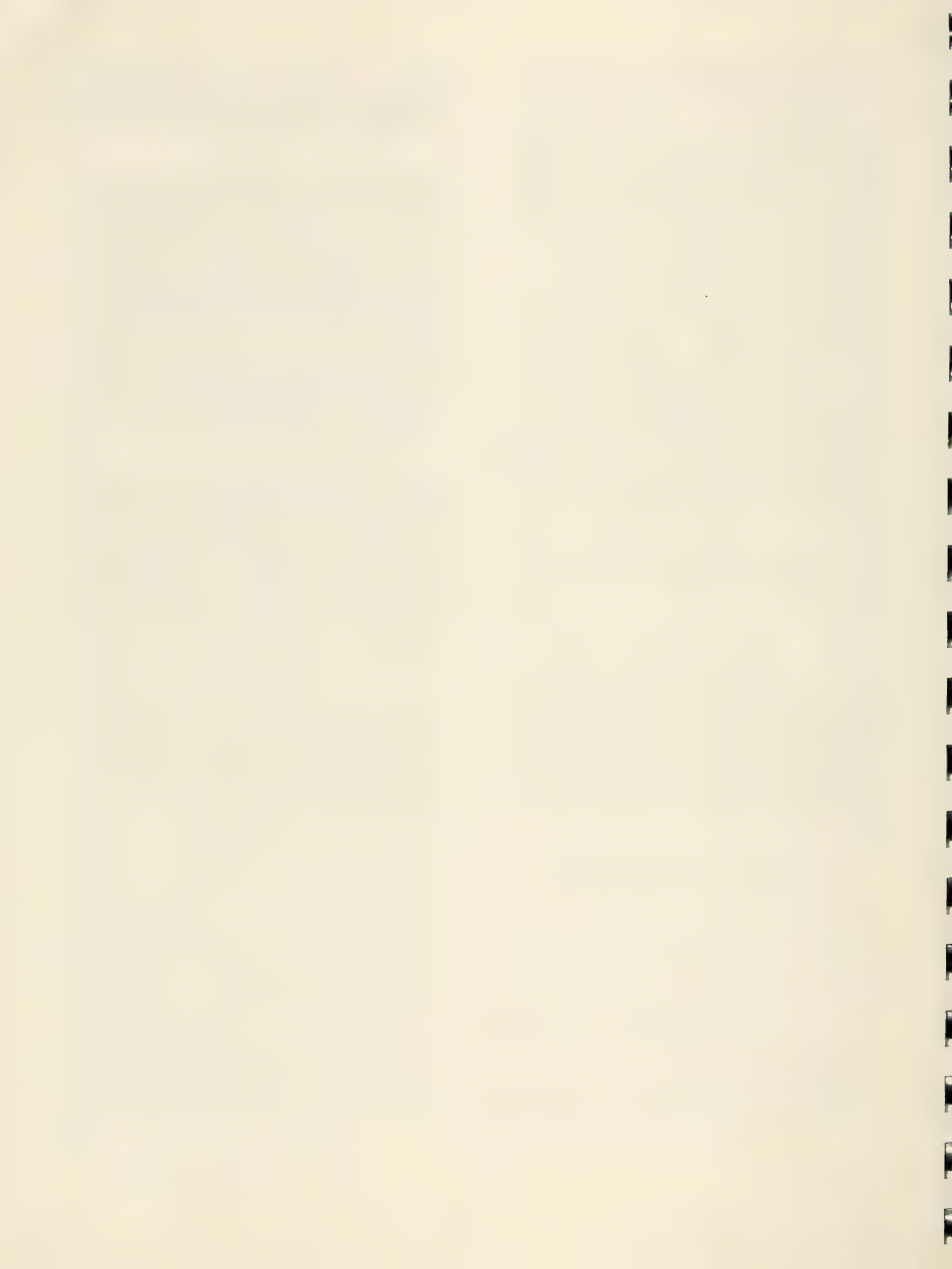
The Central Valley Project, State Water Project, and other projects of the Federal, State, and local governments and private agencies store and divert water in, and export water from, the Sacramento Valley basin. They do so under conditions established in various laws, court orders, administrative

policies, and other guiding instruments. Each agency properly regards the water it has developed as valuable property to be retained and controlled.

Unless kept separate, the water of one project is physically indistinguishable from that of another. Since the Central Valley Project and State Water Project use the same stream channels simultaneously to convey water, a coordination agreement is needed to assure that each project retains its share of the commingled water and bears its share of joint obligations to protect beneficial uses, including those of the water-related environment. Coordination also facilitates more efficient use of the available water resources.

The 1960 coordination agreement is insufficient as a guide to operations, and the 1971 draft supplemental agreement is obsolete. The latter assumes the existence of facilities that have not been constructed, outdated demands on both the Central Valley Project and the State Water Project, and old (prior to Decision 1485) Delta water quality objectives.

The proposed Agreement would fill the need for a permanent agreement based on current project facilities, expected demands, recent Delta water quality standards, and a new sharing formula. Further, the Agreement needs provisions to be adaptable to new and changing conditions.



Chapter 2. PROJECT DESCRIPTION

The U. S. Bureau of Reclamation and the California Department of Water Resources propose to execute an agreement entitled "Agreement Between the United States of America and the Department of Water Resources of the State of California for Coordinated Operation of the Central Valley Project and the State Water Project". Appendix A is a copy of this agreement.

Articles of the Agreement

Appendix A contains the full text of the Agreement, much of which requires little or no explanation. Perhaps the most essential terms of the Agreement are those concerning operations, particularly Articles 6 and 10. This section reviews the articles.

Article 1, Preamble

Names the parties to the Agreement, the U. S. Bureau of Reclamation and the Department of Water Resources, and leaves blank a citation of an act of Congress that is proposed to be enacted authorizing the Bureau of Reclamation to sign the Agreement.

Article 2, Explanatory Recitals

Gives background information and establishes the positions of the parties as they enter the Agreement.

Article 3, Definitions

Defines terms used in Article 6, Coordination of Operations. Definitions (b), "balanced water conditions," and (c), "excess water conditions," are discussed under Article 6. Definitions (d) and (e) are for "United States

storage withdrawal" and "State storage withdrawal". These definitions are complicated, but their underlying principle is simple: a storage withdrawal occurs when water is being drawn out of a reservoir or system of reservoirs at a higher rate than it is flowing in. An exception to this principle is made for water flowing into Whiskeytown Lake (a CVP reservoir) through Judge Francis Carr Powerplant. This water is imported to the Sacramento Valley basin from the Trinity River via the Clear Creek Tunnel, and it is not counted as inflow to Whiskeytown Lake. In effect, all the Trinity River water is counted as storage withdrawal.

Article 4, Term of Agreement

Provides that the Agreement remain in force and effect until: (1) terminated by mutual agreement; (2) the parties cannot reach agreement on, and an advisory board does not unanimously recommend, all terms and conditions of a wheeling purchase agreement; (3) either party fails to obtain certain water right permits or amendments; or (4) the parties cannot agree on, and an advisory board does not unanimously recommend, changes to this Agreement.

Article 5, Facilities

Identifies the existing features of the Central Valley Project and State Water Project that are recognized in the Agreement.

Article 6, Coordination of Operations

This article is the heart of the Agreement. It specifies how, and in what proportions, the two projects will:

- ° Share available water supplies;
- ° Share responsibilities to maintain Sacramento Valley in-basin use.

The sharing of water supplies and responsibilities is controlled by negotiated sharing formulas. These formulas were determined with the aid of studies in which the two projects were operated (on paper) to produce the 1980-level project supplies stated in Exhibit B-1.

The sharing formulas are structured around the necessity to meet the in-basin use requirements. As defined in Subarticle 3(a), in-basin use is all use of water of the Sacramento River system in the Sacramento Valley and the Delta, and it includes the Delta outflow and water quality requirements specified by Exhibit A of the Agreement. The Exhibit A requirements, extracted from State Water Resources Control Board Decision 1485, vary according to year types classed as "wet, above normal, below normal, dry, and critical" and according to time of year within the year types.

The amount and timing of in-basin use is not known to or controlled by the project operators and cannot be readily measured, but the Delta is downstream from all other in-basin uses, and compliance with the Exhibit A requirements or "standards" for the Delta can be monitored. If the Exhibit A standards are being met, all other in-basin use requirements are being met, because the Delta gets only the water that remains after upstream uses have been satisfied.

When water is plentiful in the Sacramento River system, the projects can store and export water to their full capabilities, and in-basin use requirements will still be met. But as runoff subsides, a time comes when water must be allocated among the two projects and in-basin uses. This time is signalled when conditions in the Delta approach the Exhibit A standards. When the Delta

reaches Exhibit A conditions, known as "balanced water conditions," the Bureau and the Department operate their projects by a sharing formula to maintain those conditions. Balanced water conditions occur in all but a few very wet years. Typically, balanced conditions begin in late spring and continue through early fall.

The projects have two mechanisms for maintaining balanced conditions: their reservoir releases, and their Delta exports. Reservoir releases plus any other water that reaches the Delta must provide enough water to meet Exhibit A and export requirements. The operators adjust the water needed to meet Exhibit A by increased reservoir releases, reduce exports, or both.

There are two kinds of reservoir releases during balanced conditions:

- ° Pass-through flows, which occur when the rate of inflow to the reservoir equals or exceeds the rate of outflow, causing either no net change or a net increase in reservoir storage.
- ° Storage withdrawals, which occur when the rate of outflow from a reservoir exceeds the rate of inflow, causing a net decrease in reservoir storage (a use of water that had been stored).

Sometimes, to maintain balanced conditions, the projects need only reduce either exports or the rate at which they are increasing reservoir storage; but as natural flows diminish, they must start making storage withdrawals to sustain their exports and provide the water required for in-basin use.

The sharing formula applies to two different situations that occur during balanced water conditions. One situation apportions the responsibility for making storage withdrawals to supply in-basin uses when flow other than from storage withdrawals (unstored flow) is insufficient to provide the full supply required to meet Exhibit A standards and

Delta export demands. The formula for sharing this responsibility is:

Central Valley Project	75 percent
State Water Project	25 percent

The other situation defines the rights of the two parties to store or export water when unstored flow is available in excess of in-basin use requirements (including Exhibit A). The formula for sharing this water is:

Central Valley Project	55 percent
State Water Project	45 percent

The formula is applied on a daily basis.

Figure 2 is a simplified illustration of how the formula operates -- simplified in that it assumes a smooth decline and buildup of runoff, constant export levels, and constant in-basin use requirements. The left side of the figure represents conditions as they might exist in the spring, when periods of balanced conditions often begin: project exports plus additions to project storage take all the unstored flow that is excess to in-basin use requirements. They take it both by exporting from the Delta and storing in their reservoirs. The Central Valley Project is entitled to 55 percent of the available excess; the State Water Project to 45 percent.

As unstored flow declines with decreasing runoff, additions to project storage must decrease to maintain exports and in-basin use. On a certain day, represented by line A-A' on Figure 2, no water is available to add to storage, and withdrawals from storage must begin thereafter to maintain exports. Until the day represented by line B-B', each project may export an amount of water equal to its storage withdrawal plus its share (as determined by the 55:45 formula) of unstored flow in excess of in-basin use requirements.

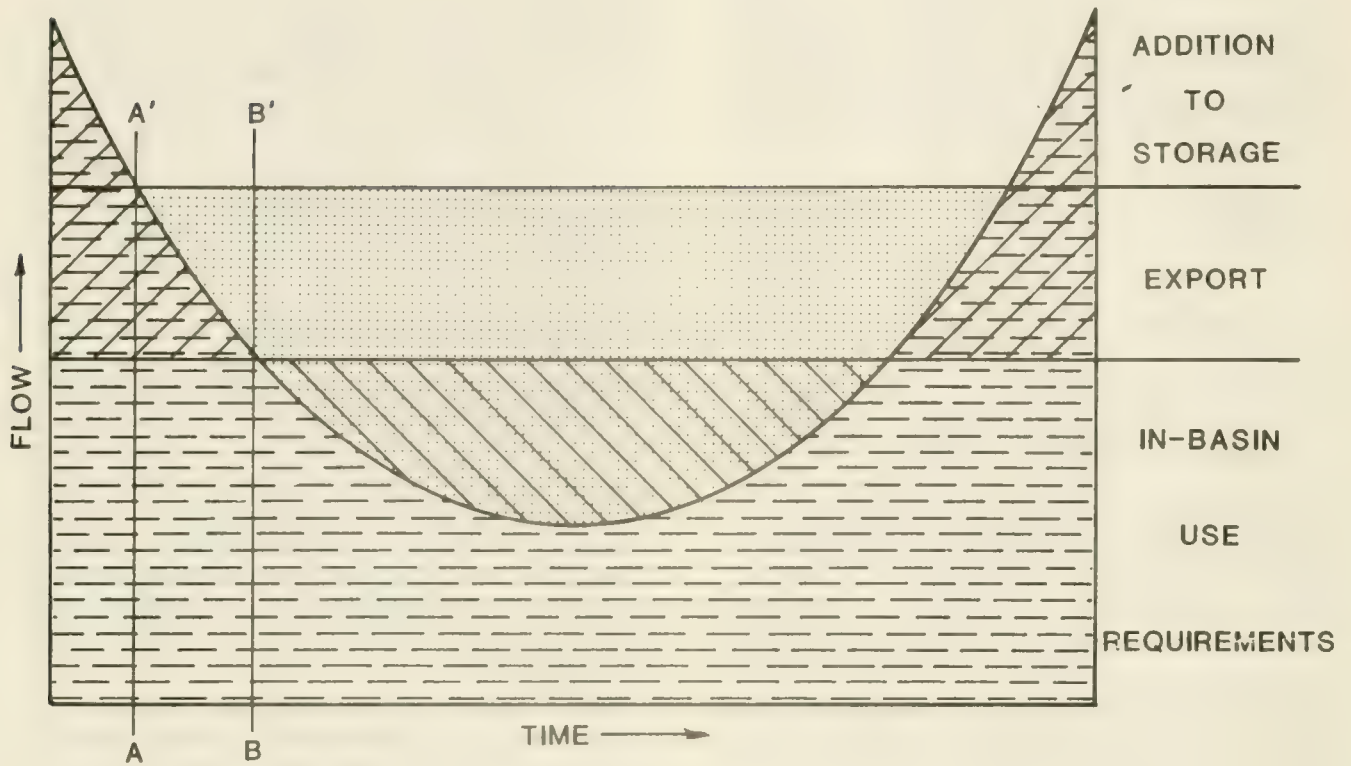
On day B-B', there is no longer any excess unstored flow to contribute to exports or to be shared 55:45, and exports equal storage withdrawals. Thereafter, storage withdrawals must be increased to exceed exports in the amount that allows in-basin use requirements to be fully met. The responsibility to make such storage withdrawals for in-basin use is borne by the Central Valley Project and State Water Project in the proportions 75:25. While the 75:25 formula is in effect, both projects are entitled to export an amount equal to their storage withdrawals, less their allocated contributions to in-basin use.

As unstored flow increases in fall and early winter, the steps are reversed. The early increases in unstored flow eliminate the need for storage withdrawals to meet in-basin use, and the 75:25 formula goes out of effect. The 55:45 formula then takes over to apportion excess unstored flow. Finally, unstored flow exceeds the sum of in-basin use, exports, and additions to storage, and neither formula is needed; "excess water conditions" exist.

In actual operation, the progression of events would not be so smooth as is indicated by Figure 2. In-basin use requirements change throughout the year, as do export levels, and runoff varies in a less regular pattern. Applied on a daily basis, the formula is able to take these variations into account. Table 1 illustrates operation of the sharing formula through a period of balanced water conditions with exports, storage, in-basin use, and unstored flow all varying. The table condenses an entire period of balanced conditions into six representative days, illustrating how the sharing formula operates and how records would be kept to assure that water and responsibilities are being shared according to the formula.

The sharing formula applies unless one project's storage withdrawal or unstored

FIGURE 2 UNSTORED FLOW AND STORAGE WITHDRAWALS UNDER BALANCED WATER CONDITIONS



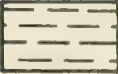



-  UNSTORED FLOW
-  UNSTORED FLOW AVAILABLE FOR PROJECT EXPORT OR STORAGE
(Shared 55% for CVP, 45% for SWP)
-  STORAGE WITHDRAWAL
-  STORAGE WITHDRAWAL TO MEET IN-BASIN USE REQUIREMENTS
(Responsibility shared 75% CVP, 25% SWP)

Table 1

APPLICATION OF THE COORDINATED OPERATION AGREEMENT SHARING FORMULAS
OVER 6 REPRESENTATIVE DAYS OF BALANCED WATER CONDITIONS*

(Values in Acre-Feet)

<u>Line</u>	<u>Note</u>	<u>Description</u>	<u>Day A</u>	<u>Day B</u>	<u>Day C</u>	<u>Day D</u>	<u>Day E</u>	<u>Day F</u>
1	1	CVP Storage	1,000	-100	-1,000	-400	-100	300
2		CVP Export	1,200	800	500	500	500	400
3	2	CVP Subtotal	2,200	700	-500	100	400	700
4	3	SWP Storage	1,000	-200	-1,200	-500	-100	300
5		SWP Export	1,500	800	400	300	600	560
6	4	SWP Subtotal	2,500	600	-800	-200	500	860
7	5	TOTAL	4,700	1,300	-1,300	-100	900	1,560
8		Formula	55:45	55:45	75:25	75:25	55:45	55:45
9	6	CVP Share	2,585	715	-975	-75	495	858
10	6	SWP Share	2,115	585	-325	-25	405	702
11	7	CVP Discrepancy	+385	+15	-475	-175	+95	+158
12	8	SWP Discrepancy	-385	-15	+475	+175	-95	-158
13	9	CVP Balance	+385	+400	-75	-250	-155	+3
14	10	SWP Balance	-385	-400	+75	+250	+155	-3

<u>NOTES:</u>	<u>Line</u>	<u>Description</u>
	1	CVP storage is the combined inflow to its reservoirs in the Sacramento Valley basin minus the combined outflow from those reservoirs and all imports to the Sacramento Valley basin from the Trinity River. Negative values indicate net storage withdrawals by the CVP. Positive values indicate net increases in CVP storage.
	2	Positive values indicate a net use of unstored flow by the CVP. Negative values indicate in-basin use of CVP storage withdrawals.
	3	SWP counterpart of Line 1. SWP has only one major reservoir, Oroville, and no imports to the basin.
	4	SWP counterpart of Line 3.
	5	Positive total indicates a net use or capture of unstored flow by the two projects combined, which means the 55:45 formula is applicable. Negative total indicates net use of storage withdrawal for in-basin use, which means the 75:25 formula is applicable.
	6	Line 7, Total, allocated according to Line 8, Formula.
	7	Line 9, CVP Share, minus Line 3, CVP Subtotal.
	8	Line 10, SWP Share, minus Line 6, SWP Subtotal.
	9	CVP balance from previous day (assumed to be zero on Day A) plus Line 11, CVP Discrepancy, for current day.
	10	SWP balance from previous day (assumed to be zero on Day A) plus Line 12, SWP Discrepancy, for current day.

* Values in this table indicate volumes of water that are representative of actual operation only in the sense that the mathematical relationships between the values are in accordance with the sharing formulas. Days represent situations that might occur through the course of a season of balanced water conditions. These situations would be likely to occur in the order presented, but not on consecutive days. Days A to F in the table are presented as consecutive to show how balances are carried from one day to the next.

flow available for export exceeds its export capability. In this event, the excess storage withdrawal or unstored flow may be exported by the project that has the capability to do so, without affecting either project's future responsibilities or daily balance.

Article 7, Forecasting

Requires each party to furnish to the other, upon request, a forecast of operations.

Article 8, Water Measurement Responsibilities

Requires that the measurements necessary to implement Article 6 be made by each party.

Article 9, Reduction in United States and State Exports

Provides that the two parties shall discuss measures to minimize water shortages for export users whenever such shortages are forecast.

Article 10, Exchanges, Conveyance, and Purchase of Water Supply

Section (a) says either party may pump and convey (wheel) water for the other party by written agreement.

Section (b) has to do with wheeling to compensate the CVP for the pumping it must forego at its Tracy and Rock Slough pumping plants in observance of Exhibit A. Exhibit A requires that CVP diversions from the Delta (through the two pumping plants) be limited to a maximum mean monthly rate of 3,000 cubic feet per second (cfs) during May and June of each year. This limitation and corresponding SWP pumping limitations to 3,000 cfs in May and June and 4,600 cfs in July are intended to minimize the diversion of young striped bass from the

southern Delta in the season when they are most numerous there. The SWP has excess capacity for pumping from the Delta, while the CVP does not. Under Section (b) the SWP would use its excess capacity to pump, at some time prior to April 30 of the following year, up to 195,000 acre-feet of water foregone by the CVP during May and June.

Subsections under (b) assure that the CVP will supply power in accordance with Exhibit D for the wheeling described in (b) and that this wheeling shall be done in an economical manner. The State requires that the United States (CVP) pay certain incremental costs associated with wheeling.

Sections (c) through (g) specify wheeling arrangements applicable to situations in which facilities of the CVP or SWP are inoperative due to scheduled or unscheduled maintenance. The SWP will wheel for the CVP in such situations, provided that the CVP supplies the necessary power and pays certain charges. The CVP will wheel for the SWP in such situations, with the understanding that it will be repaid for this service by the wheeling of an equal quantity of water for the CVP by the SWP at a later time.

Section (h) requires the parties to promptly begin negotiations toward a contract for SWP wheeling of CVP water beyond that contemplated in the preceding sections of Article 10. The wheeling contemplated in Section (h) would increase the water supply delivery capability of the CVP. The same contract would also include terms under which the CVP would sell water to the SWP. Purchases from the CVP would increase the SWP's water supply for an interim period.

Article 11, Delta Standards

Exhibit A sets forth the Delta standards for fish and wildlife and water quality that are considered part of Sacramento

Valley in-basin use and are, therefore, a key element of the Agreement. Article 11 gives force to the Exhibit A standards by saying that the Central Valley Project and the State Water Project will be operated in conformity with these standards. This article also describes how the Federal Government will respond if the State Water Resources Control Board establishes new Delta standards that are different from Exhibit A. Federal decision-makers will determine whether operation of the CVP in conformity with the new standards would be inconsistent with Congressional directives. If they determine that operation of the CVP to meet the new standards would not be inconsistent with (contrary to or in conflict with) Congressional directives, Exhibit A will be amended to conform to the new standards. If it is found that operation of the CVP in conformity with the new standards would be inconsistent with Congressional directives, the Bureau will promptly request that the Department of Justice bring a legal action to determine whether the new Delta standards should be considered legally binding on the CVP.

This article further provides that the Bureau reserve the right to seek legislation regarding operation of the CVP including compliance with any new Delta standards and the Agreement does not infer any additional authority on the Secretary of the Interior or the State Water Resources Control Board.

Article 12, Monitoring

Exhibit C describes the monitoring activities for ensuring compliance with the Delta standards of Exhibit A. Article 12 provides that the parties will share equally the cost of such monitoring. It also allows for amendment of Exhibit C if necessary. Additional monitoring in the Delta and San Francisco Bay will be covered by separate agreements.

Article 13, Records

Allows each party full access to books and records of the other party insofar as they pertain to the Agreement.

Article 14, Periodic Review

Establishes general guidelines for joint review of operations of both projects. Such a review will occur every 5 years, or more frequently if requested by either party. The factors and procedures in Article 6, Exhibits B-1, B-2, and D, and the operations study used to develop Exhibits B-1 and B-2 will be revised when necessary. If the parties are unable to agree on revisions, or fail to enter into the contract described in subarticle 10(h) by December 31, 1988, this article further specifies a negotiating procedure that includes a requirement to refer the problem to a 3-member advisory Board. If the board fails to make a unanimous recommendation within 24 months from the notice of negotiations in the case of the revisions, or 12 months for the contract, either party may unilaterally terminate the Agreement.

Article 15, Relation to Agreement of May 16, 1960

Suspends the agreement of May 16, 1960, so long as the new Agreement remains in force. Upon termination of the new Agreement, the May 16, 1960, agreement is automatically reinstated.

Article 16, New Facilities

Establishes principle that any yield created by construction of a new facility will be credited to the party that constructs the facility, or to both parties in the case of a joint undertaking. When a new facility is constructed, a review of the Agreement is required pursuant to Article 14.

Article 17, Project Service Area

Each party agrees to respect the other's project service areas.

Article 18, Third Party Rights Unaffected

Acknowledges that the Agreement is not intended to affect the rights of third parties.

Article 19, Effect of Waiver of Breach

Acknowledges that the rights of the parties under the Agreement are not affected if either party fails to object to a breach of the Agreement by the other party.

Article 20, Equal Employment Opportunities

The State agrees to standard provisions regarding treatment of employees and prospective employees without regard to race, color, religion, sex, or national origin.

Article 21, Contingent Provisions

Conditions performance of the parties on availability of funds.

Article 22, Officials Not to Benefit

Precludes certain Federal and State officials from deriving private benefit from the Agreement.

Exhibits of the Agreement

This section reviews the six Exhibits of the Agreement.

Exhibit A

This is the set of flow and water quality standards that define the Delta portion of in-basin use requirements. The standards are identical to the Delta water quality and flow standards of the State Water Resources Control Board's Decision 1485, except that the standards for Suisun Marsh that were to become effective in 1984 are omitted. The significance of Exhibit A is explained in the discussion of Article 6 and later in this chapter under "Analysis of Accomplishments of the Agreement".

Exhibits B-1 and B-2

These exhibits state annual water supplies for the Central Valley Project and State Water Project. Annual water supply is defined as the amount of water a project can deliver through a 7-year dry period such as occurred from 1928 to 1934, taking into account the allowable deficiencies. Deficiencies (delivery of less than the stated annual supply) are allowable, subject to certain conditions, as long as their total over the 7 years does not exceed 100 percent of the stated annual supply.

In developing the annual water supply figures, the Central Valley Project was allowed no more than a 25 percent deficiency in any year. The State Water Project was allowed no more than a 50 percent deficiency for its agricultural contractors in any year and no deficiencies for municipal and industrial contractors. The significance of Exhibits B-1 and B-2 is discussed later in this chapter under "Analysis of Accomplishments of the Agreement". The detailed derivation of the annual water supply figures is the subject of the "Technical Report on Determination of Annual Water Supplies for Central Valley Project and State Water Project", dated March 1984. This document is reproduced

in part as Appendix G of this report. The complete text, including operation studies, is available from the Department or the Bureau.

Exhibit C

This exhibit specifies 18 locations in the Delta where electrical conductivity measurement stations will be maintained to monitor compliance with the Exhibit A standards. Electrical conductivity is a measure of the concentration of mineral salts in water.

Exhibit D

This exhibit specifies the procedure by which the Bureau of Reclamation, as operator of the CVP, will provide the energy required to wheel its water through the SWP's Harvey O. Banks Delta Pumping Plant when such wheeling is necessary to make up for pumping foregone by the CVP in observance of the May-June pumping restrictions of Exhibit A.

Although CVP water will not be wheeled at the Banks plant during May and June, the CVP will have the option to provide the SWP with energy during those months in any amount up to what would be required for all the pumping it is foregoing because of the Exhibit A pumping restrictions. In recognition of the CVP's energy contribution (if any), the SWP will establish a CVP energy account in dollars and based on the value of the CVP energy at the time it is received. The SWP will use the value residing in this account as credit against its cost for the energy required to wheel the CVP's makeup water when the wheeling actually occurs. Should the account be insufficient to cover the cost of all the energy required, the CVP may supply the balance in the form of energy.

Alternatively, the CVP may elect not to establish an energy account with the SWP, and instead supply all the

necessary energy when wheeling is occurring.

Exhibit E

This exhibit specifies the deficiency provisions applicable to any sale of CVP water to the SWP that may occur under the contract referred to in Article 10(h). The language in this Exhibit is taken from a recently executed CVP water service contract. When the CVP, because of drought or other reason beyond its control, does not have enough water to fully meet its contracts, including any contract it may make with the State, it imposes deficiencies; i.e., the contractors get less than their full contractual supplies. In general, the available supplies are apportioned by reducing deliveries to all contractors by the same percentage, regardless of whether the contractor buys water for agricultural or municipal/industrial use.

Analysis of Accomplishments of the Agreement

The preceding sections reviewed the articles and exhibits of the Agreement. This section discusses the overall significance of the Agreement, which would:

- ° Commit both the Central Valley Project and the State Water Project to meeting water quality and outflow standards for the Delta that are equivalent (at least as far as the Delta is concerned) to the State Water Resources Control Board's Decision 1485 standards.
- ° Establish mutually recognized annual water supplies of the two projects.
- ° Establish a new sharing formula.
- ° Firm up certain arrangements for wheeling and require negotiations toward purchase and additional wheeling of CVP water.

Delta Water Quality and Outflow Standards

State law requires the State Water Project to be operated in compliance with Delta standards established by the State Water Resources Control Board. The State has always maintained that the U. S. Bureau of Reclamation is obligated to operate the Central Valley Project to meet the same standards. The Bureau maintains that the current State standards are not binding on the Central Valley Project and that water quality protection in the Delta is not an authorized purpose of the CVP.

The State Water Resources Control Board adopted the current Delta standards in its Decision 1485 (August 1978). On January 3, 1979, the Secretary of the Interior announced that his agency (of which the United States Bureau of Reclamation is a part) would voluntarily meet the State Board's standards for the Delta; however, there were two conditions:

- ° The Secretary's commitment to meet standards was to remain in effect only until the legal question of mandatory Federal compliance was settled by Congress or the courts.
- ° This commitment did not extend to years of extraordinary drought, such as 1977.

So, at the beginning of negotiations toward the present draft Coordinated Operation Agreement in 1979, the Bureau viewed its obligation to meet State standards in the Delta as limited and conditional and only the expressed policy of the Secretary of the Interior, not a binding legal obligation. That situation has not changed.

The Bureau considers its only binding legal commitments regarding Delta water quality to be those contained in the water quality provisions of its water rights exchange contracts with water users in the lower San Joaquin basin.

In these contracts, the Bureau agrees to supply water of specified qualities via its Tracy Pumping Plant. If the draft Coordinated Operation Agreement were not signed, the Bureau could attempt to operate only for these "Tracy standards" in an extreme drought year under its current policy, and in any other year if that policy were changed by the Secretary of the Interior. The Tracy standards are less demanding on project operations and not as comprehensive as those of Decision 1485.

Because the State Water Resources Control Board holds the Central Valley Project and State Water Project jointly responsible for maintaining Delta standards, any possibility that the Central Valley Project will not be operated to provide its share of the water needed to meet these standards represents a serious concern for the State Water Project. The Department of Water Resources might have to make up the Central Valley Project share with the State Water Project's limited and fully committed water supplies, or else petition the State Water Resources Control Board for relief. The consequences of the Central Valley Project not being operated to meet Delta standards are elaborated upon in Chapter 4.

In executing a Coordinated Operation Agreement as drafted, the Central Valley Project and State Water Project would obligate themselves to meet the Delta standards contained in Exhibit A of the Agreement. The Exhibit A standards are taken from Decision 1485, although certain standards for the Suisun Marsh have been omitted. The reasons for and significance of this omission are discussed in Chapter 3 under "Modified Agreement".

The commitment by the parties to meet the Exhibit A standards is an environmental commitment inherent in the Proposed Action.

The Agreement would not commit the Bureau to accept any future Delta

standards that may replace or supersede those of Decision 1485. If such new Delta standards were established, Federal decision-makers would determine whether operation of the CVP to meet the new standards would be inconsistent with Congressional directives. If they determine that operation of the CVP to meet the new standards would not be inconsistent with (contrary to) Congressional directives, Exhibit A would be amended to conform to the new standards, and both projects would operate accordingly. If the decision-makers determine that operation of the CVP to meet the new standards would be inconsistent with Congressional directives, the Bureau must promptly ask the Department of Justice to bring a legal action to determine the applicability of the new standards to the CVP.

Annual Water Supplies

The Agreement estimates mutually recognized annual water supplies of the Central Valley Project and State Water Project, in Exhibit B-1 for 1980 and in Exhibit B-2 for "full development". Development relates to demand for water, not to development of project facilities. These supplies were computed using mathematical procedures wherein the operational capabilities of existing facilities of the two projects are superimposed on sets of conditions representing a level of development, demand for water from the projects, and naturally occurring hydrology.

The water supply computations reflect a priority concept that is an important assumption of the Agreement. Under this assumption, the CVP facilities built before the State Water Project are assumed as having whatever water supply yield they would have if the later projects had not been built. The State Water Project and the CVP's San Luis Unit are then considered to have equal claims on the remaining water.

The supplies computed for 1980, 6.9 million acre-feet for the Central Valley Project and 3.7 million acre-feet for the State Water Project, were used in deriving the sharing formulas of Article 6. The 75:25 formula was carried over from the previous draft Coordinated Operation Agreement, and was regarded by negotiators for both agencies as fair, considering the much larger portion of the Sacramento basin that lies downstream from Central Valley Project storage facilities. The 55:45 formula is geared to realizing the 1980-level supplies of Exhibit B-1 for both projects through a period of relative drought, such as occurred from 1928 to 1934.

Exhibit B-2, which is based on the year 2020, illustrates how much water each project may have at its full development level under principles and assumptions accepted by negotiators of the Agreement as valid for illustration purposes. Central Valley Project supplies are higher for 2020 than for 1980, because for 2020 it is assumed that the CVP is making full use of water it can rightfully claim and deliver to existing or potential contractors without new yield-augmenting facilities. State Water Project supplies are lower for 2020 than for 1980, partly because much of the CVP increase in supply over the same time span represents water that the SWP was using at the 1980 level. The State Water Project was using this water because the Central Valley Project lacked either the demand for it or the means to deliver it. As Central Valley Project demands and deliveries increase upstream from the Delta, less water reaches the Delta for export by the State Water Project.

The CVP year 2020 annual supply stated in Exhibit B-2 is subject to reduction by the commitment of additional water for fish protective flows in the Trinity River (see discussion in Chapter 4 under "Other Projects and Actions").

By quantifying water supplies, Exhibits B-1 and B-2 (particularly B-2) may represent a step in the direction of allowing the Central Valley Project to enter new contracts. If the Central Valley Project is to realize its full development water supply, it will have to make new contracts and serve new areas. However, the connection between the Coordinated Operation Agreement and any potential new contracts is tenuous. First, the Coordinated Operation Agreement is not a prerequisite to such contracts; new Central Valley Project contracts may be signed with or without the Coordinated Operation Agreement. Second, Exhibit B-2 is included in the Agreement more to establish the positions of each party with respect to the rights of the other party than to indicate a physical presence of contractable water. Whatever water is physically available in the system is available regardless of the Agreement. Third, the Agreement would not trigger any new contracts; each contract would be a separate and independent action subject to studies on water availability and environmental impact.

Sharing Formula

The operators of the Central Valley Project and State Water Project consider the new formula for sharing unstored flow more fair and workable than the formula used previously.

An important difference between the new and old formulas is that in the situation of balanced water conditions where storage withdrawals are not required to maintain in-basin use, the new formula allocates all the unstored flow available to the projects, including that being put into storage. The old formula allocated only the unstored flow available for export in the Delta; it did not allocate inflow to either project's reservoirs that could have been unstored flow available for export had the project chosen to release (pass it through) rather than store it.

This omission in the old formula allowed at least the potential for, if not the actual accomplishment of, schemes to increase one project's exportable water supply at the expense of the other project. In such schemes, the strategy would be to avoid releasing water from a reservoir unless the release could be counted as a storage withdrawal. This strategy could be effective because the full amount of a storage withdrawal could be exported by the project that made it, but any other release had to be shared. With its smaller delivery obligations, lesser inflow, and higher pumping and conveyance capability, the State Water Project was in the best position to profit from this strategy. With limited export pumping capability in the Delta, the Central Valley Project sometimes might need to reduce its rate of storage upstream to sustain its maximum export level. Reduction in the Central Valley Project storage rate would take the form of releases, and these would count as exportable unstored flow when they reached the Delta.

The old agreement had a complicated formula for calculating shares of exportable unstored flow, but the State Water Project was usually entitled to 60 percent. Thus, for an acre-foot of unstored flow released to maintain its exports, the Central Valley Project could actually export only four-tenths of an acre-foot, with the other six-tenths going to State Water Project export if the SWP operated to take full advantage of the CVP's predicament.

The Central Valley Project was perhaps disadvantaged, but certainly not defenseless, under the old formula. With its multiple reservoirs, it had, at least in theory, the capability to minimize exportable unstored flow in the Delta by drawing down one reservoir at a time. This would force the State Water Project into greater reliance on its own storage withdrawals. Also, if the operators of the CVP believed their project was suffering under a disadvantage in operating by the old

sharing formula, they were never under an obligation to abide by it for more than one year at a time.

The new sharing formula for allocating unstored flow, because it applies to all unstored flow whether available in the Delta or not, assures that this prized commodity will be shared in the proportions specified.

Wheeling Arrangements

Sometimes one or the other project needs to have some of its water conveyed (wheeled) in facilities of the other project. Article 10 of the new Agreement provides an arrangement to cover wheeling in certain situations. These situations occur during outages in the facilities of either project and whenever the Central Valley Project has had to curtail export pumping at the Delta (per Exhibit A requirements) to minimize diversion of young striped bass during May and June.

Under Article 10, wheeling can be done on a more reliable basis, because compensation for the wheeling party is already negotiated and predetermined. The terms of compensation are similar to what have been used in the past.

The wheeling specifically provided for by the Agreement is limited to certain

situations. This limited wheeling facilitates maintenance of current levels of water service from the Delta by the SWP and CVP.

The wheeling to be discussed in the required negotiations could increase the capability of the CVP to export water from the Delta. The required negotiations would also deal with proposed purchases of water from the CVP by the SWP. The SWP faces water delivery obligations in excess of its current capabilities and needs additional water supplies to meet these obligations. Any water the SWP might be able to purchase from the CVP would be supplied to the SWP's Clifton Court Forebay for export from the Delta at the Harvey O. Banks Delta Pumping Plant.

The effect of the Agreement is to require the negotiations and not to institute the wheeling and water purchase arrangements that will be the subject of the negotiations. However, Congressional ratification of the Agreement will resolve the situation created by the Secretary's 1978 decision to temporarily suspend further water service contracting until the applicability of Exhibit A standards to the CVP was resolved. Therefore, upon ratification, the CVP's objective to implement a full-scale water marketing program of its available supplies can be implemented.

Chapter 3. ALTERNATIVES

As in any other proposed agreement resulting from a negotiation process, the parties have three options in addition to the no agreement option: accept the agreement, reject the agreement, or continue to negotiate. Accordingly, the following three alternatives are considered in this report:

- ° The Proposed Action; representing the parties' option to accept the proposed Agreement. Consideration of the Proposed Action as an alternative is required under the National Environmental Policy Act.
- ° No Action; representing the parties' option to reject the Agreement. No Action is also an alternative required by NEPA. It is assumed in the No Action alternative that the Central Valley Project and the State Water Project would continue to coordinate their operations, although without a long-term agreement.
- ° Modified Agreement; representing possible outcomes of resumed negotiations. Executing a modified agreement may be considered an alternative to the Proposed Action as long as the agreement, as modified, fulfills the "Need for Action" described in Chapter 1.

The no agreement option is also considered. This alternative represents a complete breakdown in coordination of the two projects.

The Proposed Action and No Action were studied in more detail than the other alternatives. They are evaluated in Chapter 4, and that evaluation is summarized in this chapter.

Alternative 1, The Proposed Action

The Proposed Action, signing and implementing the draft Coordinated Operation Agreement, is described in Chapter 2. Under the Proposed Action the Central Valley Project and State Water Project would continue to operate as they have in recent years, although using a different sharing formula. The new sharing formula would not result in physically observable changes. The Delta water quality and outflow standards of the Agreement's Exhibit A would be binding on both projects in all years.

Alternative 2, No Action

If the Proposed Action (or some action like it) is not taken, and until it is taken, the Bureau or DWR will probably enter agreements each year to operate according to the terms of the draft Agreement for that year only. This would be consistent with the past practice of agreeing annually to operate according to the terms of the unsigned draft 1971 agreement, modified to include the Delta water quality and outflow standards of Decision 1485.

The main environmental difference between taking the Proposed Action and not taking it (No Action) is that without the Proposed Action, each year represents an independent decision point at which the Bureau of Reclamation might not agree to operate the CVP in accordance with the Delta water quality and outflow standards of the Agreement's Exhibit A. The Exhibit A standards are taken from Decision 1485.

Current Bureau policy, announced by Secretary of the Interior Cecil D. Andrus on January 3, 1979, is that the Bureau will meet the Decision 1485 standards in all but "years of extraordinary drought, such as occurred in 1977" /3/. This policy could be changed by another secretarial decision.

Should the Bureau decide in any year, not to meet the Decision 1485 standards for the Delta, it would still be obligated to meet the CVP's own standards for the quality of water pumped at the Tracy Pumping Plant in the southern Delta. These "Tracy standards" are contained in the Bureau's contracts with users of water from the Delta-Mendota Canal. The contracts set the following average salinity requirements in total dissolved solids (TDS) per liter:

	<u>TDS</u>
Annually	450
Monthly	600
Daily	800

Evaluation of the No Action alternative is based on an assumption that the Bureau would operate the CVP to meet only the Tracy standards rather than those of Exhibit A or Decision 1485 during critical type water supply years. In all other years, the CVP would be operated to meet the Exhibit A standards. About one-seventh to one-eighth of the historical water years for which good records are available have been dry enough to be considered critical by the most commonly used standard, the Four Rivers Index; however, the assumption that the Bureau would operate for Tracy standards was made only for critical years in which the Bureau would have to impose water supply deficiencies on CVP contractors. Most, but not all of the historical critical years were dry enough to require that action.

The assumption that the CVP would be operated for Tracy standards in critical years should not be taken to imply that Bureau policy is or would be to so

operate. Current Bureau policy is to operate to meet the Decision 1485 standards in ordinary critical years and to consider not meeting these standards only in years such as 1977, the driest year of record.

If the Bureau were operating the CVP for Tracy standards in critical years, it is uncertain how the Department would operate the SWP in those years. The Board's Decision 1485 says:

"The effect of the Delta Plan and this decision is that water quality standards in the Delta must be satisfied prior to any export from the Delta to other areas for any purpose. These standards must be maintained as first priority operating criteria for any and all projects or parts thereof that may be constructed and operated under the permits considered in this decision."

The permits considered are those of the SWP and CVP. One interpretation of this passage is that the SWP is fully responsible to meet the Board's standards whether the CVP participates in meeting them or not. However, the SWP's water supplies are limited and fully committed even when the CVP is fully participating in the maintenance of the Delta standards. Without CVP participation in critical years, the capabilities of the SWP to meet its obligations to water contractors and the Delta would be limited, and the Department might petition the Board for relief.

The outcomes of such a petition could range from no relief to a complete relaxation of Delta standards such that the CVP's Tracy standards would control in critical years. For the initial analysis of the No Action alternative, it was assumed that this complete relaxation would occur. Two other cases, in which the standards were relaxed partially and not at all, were also examined. Thus, three cases of the No Action alternative were postulated for critical years:

Case A -- Both the CVP and the SWP are operated to meet only the CVP's Tracy standards in the Delta.

Case B -- The CVP is operated to meet Tracy standards, while the SWP is operated to make the same contribution of water for the Delta as it would with the Proposed Action.

Case C -- The CVP is operated to meet Tracy standards and the SWP is operated to meet the Exhibit A standards, contributing all the extra water required, including that which would be the CVP share under the Proposed Action.

For years other than critical years, it was assumed in all cases of the No Action alternative that both the CVP and the SWP would be operated to meet the Exhibit A Delta standards.

Alternative 3, Modified Agreement

If the Department and/or the Bureau decided not to execute the proposed Agreement, and if negotiations were resumed, a modified agreement might eventually result. Existing terms of the Agreement could be altered, and anything could be added on or taken away. Discussion here will focus on several changes that would still meet the purposes of the action described in Chapter 1.

Modifications Within the Present Scope

Modifications in this category would not require adding new terms to the Agreement. Rather than adding terms, the existing terms would be altered.

Modified Sharing Formulas. Article 6 of the Agreement says that during balanced water conditions, the responsibility to make storage withdrawals will be shared in the proportions 75:25 by the Central Valley Project and State Water Project,

respectively; unstored flow for export or storage will be shared in the proportions 55:45. Different proportional shares could have been agreed upon. The effect of changing the agreed-upon proportional shares would be to change the water supplies of the two projects, and probably not in mutually beneficial ways.

The two projects are in much different situations in regard to water supplies and demands. The Central Valley Project has developed water supplies in excess of its present demand, and the State Water Project faces demands and contractual obligations in excess of its developed supplies. The sharing formulas in the draft Coordinated Operation Agreement essentially allow the Central Valley Project to meet its demands; the State Water Project, meanwhile, uses all of its own water supplies plus Central Valley Project releases that are left over after CVP export demands are met. Operating the CVP to meet all of its current objectives results in surplus water in the Delta that the CVP cannot use, and this surplus is available under the sharing formulas to the State Water Project.

In the storage withdrawal formula, higher numbers mean lower water supplies for a project. For instance, if the Central Valley Project share were increased to 80 percent from the 75 percent in the draft Agreement, Central Valley Project water supply reflected in Exhibit B-1 would be reduced and State Water Project supply would be increased. The result of operating according to an Agreement with this modification would be that the Central Valley Project contractors would have less than their full supply, and the State Water Project contractors could get more water.

In the unstored flow formula, higher numbers mean higher water supplies for a project. If the Central Valley Project share were increased from the 55 percent in the draft Agreement to 60 percent, Central Valley Project water supply

reflected in Exhibit B-1 would be increased and State Water Project water supply reduced. The result would be more water supply than the Central Valley Project needs and a greater likelihood and magnitude of deficiencies for State Water Project contractors.

The negotiators of the proposed Agreement, through detailed studies and public negotiations, selected the 55:45 and 75:25 ratios for Article 6 because it struck a balance favorable to both projects. Other ratios were considered less advantageous for one or both projects. Public renegotiations would be needed to modify these ratios. It is important to recognize that changes to the ratios would not change the degree of protection of Exhibit A, only the sharing of responsibility to meet such protection.

Inclusion of Post-1984 Standards for Suisun Marsh. Exhibit A of the Agreement includes all of the Delta water quality and outflow standards of Decision 1485 except the ones for Suisun Marsh that became effective in October 1984. The Department and the Bureau, in cooperation with other agencies, are developing a plan for water quality protection in Suisun Marsh /5/.

Initial facilities providing for partial protection of Suisun Marsh have been constructed by the Department under a contract with the Department of Fish and Game and the Suisun Resource Conservation District, and a contract for construction and operation of more extensive Suisun Marsh facilities is being negotiated.

The post-1984 standards for Suisun Marsh were not included in Exhibit A because it was agreed by the Department and the Bureau that the Agreement would contemplate existing facilities only. Also, negotiations concerning protection of Suisun Marsh were proceeding separately, so the marsh was considered a separate issue. The Department has prepared a Suisun Marsh Plan of Protection, which

includes an environmental impact report /6/. Suisun Marsh protection is expected without a specific provision in the Agreement, and the Agreement includes provisions to incorporate future contracts on Suisun Marsh. Public renegotiations on the Agreement for Suisun Marsh provisions would be possible in the future, but would only duplicate water quality protection of negotiations now underway.

Modified Exhibit A. The Delta water quality and outflow standards of Exhibit A have been part of operations of both projects each year since they took effect in water year 1979. The effectiveness of the standards in maintaining the Delta fishery resource, especially for striped bass, has been disappointing. The steady decline of the striped bass fishery, observed since the 1960s, has not been arrested. Resource levels in some other fish species also appear to be in decline.

The reasons for the decline of the Bay-Delta fishery are not well understood, but some people have suggested that combined CVP and SWP operations are at least partly at fault. Other concerns are toxics and pollution. One way to attempt to halt the decline of the Bay-Delta fishery would be to change the Delta water quality and outflow standards applicable to operation of the projects. This could be done by modifying Exhibit A of the proposed Coordinated Operation Agreement.

The possibility of modifying Exhibit A standards was reviewed; however, important points related to this matter must be considered:

- ° The existing standards are the best established method to define protection.
- ° The State Water Resources Control Board is responsible for changing standards, which involves comprehensive public hearings.

Many studies of the Delta-Bay ecosystem or some part of it are underway, and knowledge increases every year. So far, however, not enough is known to identify the conditions causing the fishery decline or to determine whether revising the Delta standards could arrest or reverse it.

The State Board said that setting the Decision 1485 standards involved "essentially the allocation of water shortages". It also said the Decision attempted to strike a balance between competing needs. Adjusting the balance to give more weight to environmental protection -- by allocating more water for this purpose -- would be expected to benefit the environment. The benefits would be difficult to predict and quantify.

The State Board is aware of the environmental problems that have been observed through the six or so years of operating to the Decision 1485 standards, and will begin reconsideration of those standards in 1986. Revised standards are expected by 1988. Article 11 describes how the parties to the Agreement will respond when revised standards are declared.

The Modified Exhibit A alternative is not considered further in this report because an agreement in which the Decision 1485 standards are modified in an attempt to correct or ameliorate such problems as the fishery decline would go beyond the underlying purpose and need and the objectives intended for the Proposed Action. The Proposed Action aims to define the respective responsibilities of the CVP and SWP toward meeting existing obligations, not to define what the projects' obligations should be.

Modifications That Broaden the Scope

This category is intended for modifications that could require new terms to be added to the Agreement. Any number

of new terms on any subject could be added. The modifications discussed here were selected because they were considered at some time in the negotiations toward the present draft Agreement or they were considered in some other forum or context by both the Department and the Bureau as issues that might be settled by an agreement.

U. S. Fish and Wildlife Service Proposal. Representatives of the U. S. Fish and Wildlife Service attended a Coordinated Operation Agreement negotiating session on July 14, 1982, to present the following draft article for the negotiators' consideration.

Article Title: Coordination for Fish and Wildlife - Water Quality and Supply

To the extent that they can be achieved with existing project facilities, the projects shall be operated to achieve the following goals:

1. Restore and maintain populations of fish and wildlife on the average at pre-project levels; and
2. Realize the projects' present and future potential for increasing these resources above pre-project levels consistent with other purposes of the projects.

Any such cooperation requested or identified by a conservation agency that would require an unauthorized action by either water project should be brought to the attention of the Area Manager, U. S. Fish and Wildlife Service, the Director, California Department of Fish and Game, and if appropriate, the Regional Manager, National Marine Fisheries Service, with the aim towards seeking an authorized method to effect such cooperation. Descriptions of cooperative action and further guidance are specified in Exhibit A.

The "Exhibit A" referred to in this draft article is not Exhibit A of the Agreement, but rather a proposed exhibit that the Fish and Wildlife Service intended to prepare. Fish and Wildlife Service representatives said this exhibit would give examples of how coordinated operations could benefit fish or wildlife in specific instances, such as when one project might be able to release water when the other project was unable to provide water for instream use.

The environmental consequences of the Department and Bureau agreeing on the Fish and Wildlife Service's proposed article are difficult to gauge. It states goals rather than specific actions, and the goals are somewhat unclear, especially as regards the definition of "pre-project levels".

The apparent objective of the Fish and Wildlife Service's proposed article is to achieve higher fish and wildlife resource levels than presently exist and may exist in the future. To the extent that this goal might be achieved if the article were incorporated in the Agreement, the modification could have positive environmental effects as compared to the Agreement without the modification. The Fish and Wildlife Service proposal was not spelled out in enough detail to allow further analysis.

Like the modified Delta standards alternative, discussed earlier, the fish and wildlife service proposal would go beyond the underlying purpose and need and the objectives intended for the Proposed Action.

Estuary Fish and Wildlife Agreement. In 1974, the Department of Water Resources, the U. S. Bureau of Reclamation, the Department of Fish and Game, and the U. S. Fish and Wildlife Service signed a statement of intent to enter a 4-agency agreement for the management of fish and wildlife resources of the Sacramento-San

Joaquin Delta prior to construction of the then-proposed Peripheral Canal. Such a 4-agency agreement was drafted, but not executed. The draft, however, was used as a basis for the fish and wildlife standards contained in Decision 1485. Senate Bill 200 (1980), which was intended to authorize construction of the Peripheral Canal and other State water facilities, would also have required that the Department of Water Resources enter into a permanent agreement with the Department of Fish and Game. Senate Bill 200 was overturned in a statewide referendum.

The scope of current negotiations toward a 2-agency agreement is limited to mitigation for any adverse effects attributable to operation of four new pumps the Department of Water Resources plans to install at the Harvey O. Banks Delta Pumping Plant.

According to the environmental impact report for one draft of a 2-agency agreement, implementation of that agreement would have no significant adverse environmental impacts and would provide "equivalent or better protection for fish and wildlife resources than current Bay-Delta protective criteria established by Decision 1485" (and hence, the standards of Exhibit A) /7/. The same could probably be said about any other 2-agency agreement that the Department of Water Resources and the Department of Fish and Game might execute.

Any attempt to merge an estuary fish and wildlife agreement with the proposed Coordinated Operation Agreement would have prolonged and complicated the already difficult negotiations. Also, this alternative would go beyond the underlying purpose, need, and objectives intended for the Proposed Action. It would address meeting obligations that do not now exist in lieu of defining the responsibilities of the CVP and SWP to meet existing obligations.

Modifications That
Narrow the Scope

This category represents modifications in which terms are subtracted from the Agreement.

Proposed Agreement Without Article 10(h). The proposed Agreement was originally submitted to the directors of the Department and the Bureau in December 1982 as a draft. This 1982 draft did not include a requirement, like the requirement in Article 10(h) of the current draft, that the parties negotiate a subsequent contract regarding SWP wheeling and purchase of CVP water.

In such a subsequent contract, the capabilities of the CVP would be expanded by increasing the availability of wheeling services from the State Water Project. Correspondingly, the capabilities of the SWP would be expanded by acquiring the ability to purchase water supplies from the CVP. For both projects the result would be increased capability to export water from the Delta for an interim period.

The direct impacts of water purchase and wheeling under such a subsequent contract would be more properly attributable to that contract than to the Proposed Action, but such impacts could be considered cumulative impacts relative to the Proposed Action. These impacts, as cumulative impacts, are discussed in the "Cumulative Impacts" section of Chapter 4.

Impacts of implementing an agreement similar to that of the Proposed Action, but modified to eliminate Article 10(h), would be the same as impacts of the Proposed Action, except that cumulative impacts attributed to Article 10(h) in "Cumulative Impacts" would be absent.

Alternative 4,
No Coordination

This alternative is not necessarily independent of the No Action alternative, but it represents a different No Action scenario than that considered in the analysis of the No Action alternative. The difference between No Coordination, as will be discussed here, and No Action is that in the No Coordination alternative all the functions of a Coordinated Operation Agreement are absent. This means the CVP and the SWP do not coordinate operations and do not necessarily recognize the same Delta water quality standards at any time. In all No Action cases considered, the two projects are operated in a coordinated manner, and the only differences between the three No Action cases and between those cases and the Proposed Action are in regard to the Delta standards each project recognizes in critically dry years.

In general, lack of communication or planned coordinated operation would cause probable inefficient use of water supplies and could threaten the protection of the Delta and the delivery capabilities of both projects.

In 1983, the CVP and SWP operated without a coordination agreement, and no problems arose, but that is only because so much water was available in that very wet year that neither project had the physical capability to infringe on the other's water supplies or to deny the Delta water to meet its use and outflow requirements. In drier years, however, the No Coordination situation would be inefficient and confusing. It would also result in a court establishing the respective responsibilities of the Department and the Bureau concerning the Delta. This alternative was not considered realistic and, therefore, was not analyzed further.

**Conceptual Comparison:
Proposed Action versus No Action**

Since they represent the two options available to the parties, the Proposed Action and No Action were studied in more detail than the other alternatives. Table 2 illustrates the differences between the Proposed Action and the No Action alternatives as they were conceived and analyzed.

Table 2

**CONCEPTUAL COMPARISON OF
CRITICAL YEAR OPERATIONS,
PROPOSED ACTION VERSUS NO ACTION**

Alternative	Storage		Export		Required Delta Outflow
	SWP	CVP	SWP	CVP	
Proposed Action	0	0	0	0	0
No Action					
Case A	+	+	0	0	-
Case B	0	+	0	0	-
Case C	0	+	-	0	0

EXPLANATION:

- 0 = No Change from Proposed Action.
- + = Increase from Proposed Action.
- = Decrease from Proposed Action.

- Case A -- CVP and SWP meet Tracy standards.
- Case B -- CVP meets Tracy standards;
SWP releases its share of Exhibit A.
- Case C -- CVP meets Tracy standards;
SWP meets Exhibit A in full.

In the table, the Proposed Action sets the conditions to which the alternatives are compared. This is because the Proposed Action most nearly approximates continuation of the status quo. The State Water Project and the Central Valley Project have been operating to meet Delta standards equivalent to those of Exhibit A of the Coordinated Operation Agreement since 1979. It should be noted, however, that no critical years have occurred since 1977.

In No Action, Case A, Delta water quality standards are reduced during periods of balanced water conditions in critical years; the Tracy standards replace the Exhibit A standards, allowing the two projects to retain more water in their reservoirs. In Case B, the increase in SWP reservoir storage observed in Case A is eliminated, as the SWP releases its share of the storage increase. Delta outflow is higher in Case B than in Case A, but still less than with the Proposed Action. Case C represents a more extreme case, in which the SWP guarantees the Delta outflow levels of the Proposed Action without CVP cooperation. To do this, the SWP must reduce its export pumping from the Delta as well as eliminate the reservoir storage increase observed in Case A.

The conceptual scheme described in Table 2 may be unrealistic in regard to what the projects would do with any water saved by operating to Tracy standards rather than to Exhibit A standards. It is assumed that the entire saving is retained in reservoir storage. As an alternative to retention in storage, the projects could use the saving to deliver more water to their contractors, who in critical years would likely be receiving less than their normal water supplies. The same water saving might also be used to improve the quality of water exported from the Delta, in which case Delta outflow would increase (as compared to No Action, Case A) and water qualities in the Delta would improve generally. The assumption that the entire saving would be retained in storage was made because it describes the simplest case and is not implausible; saving the water in the reservoirs strengthens the projects' insurance against continued drought.

The differences between the Exhibit A standards and the Tracy standards are key to the analysis of alternatives, at least as far as the Delta is concerned. Table 3 compares flows and salinities that would be expected during balanced

water conditions in a critical year when the Tracy standards are being met to the same year with the Exhibit A standards being met. In each instance, the comparison is made at the point in the Delta that would have the controlling standard. The controlling standard is the most demanding requirement in effect

at a particular time. If the controlling standard is met, the other standards applicable at that time will also be met. At all times of the year, outflows are less and water qualities are worse under Tracy standards than they would be under the standards of Exhibit A.

Table 3

COMPARISON OF SALINITIES AND FLOWS AT CONTROLLING STATIONS IN CRITICAL YEARS
EXHIBIT A VERSUS TRACY STANDARDS

Period	Controlling Exhibit A Station	Exhibit A Standard	Associated Tracy Standard*	Difference	Delta Outflow	
					Exhibit A	Tracy Standard
January - March	Rock Slough	150 ppm	315 ppm	+165 ppm	6,700 cfs	4,100 cfs
April 1 - April 15	Chipps Island Rock Slough	6,700 cfs 150 ppm	4,100 cfs 315 ppm	-2,600 cfs +165 ppm	6,700 cfs	4,100 cfs
April 16 - April 30	Rock Slough	150 ppm	315 ppm	+165 ppm	6,700 cfs	4,100 cfs
May 1 - May 31	Rock Slough	150 ppm	255 ppm	+105 ppm	4,900 cfs	3,800 cfs
June 1 - August 15	Jersey Point	2.2 mmho	2.9 mmho	+0.7 mmho	4,000 cfs	3,800 cfs
August 16 - September 30	Rock Slough	250 ppm	255 ppm	+5 ppm	4,100 cfs	3,800 cfs
October 1 - November 30	Rock Slough	250 ppm	285 ppm	+35 ppm	4,700 cfs	4,000 cfs
December 1 - December 31	Rock Slough	250 ppm	315 ppm	+65 ppm	5,500 cfs	4,100 cfs

* Salinity or flow projected at the controlling Exhibit A station, assuming CVP and SWP are operating to meet Tracy standards only (No Action, Case A).

ppm = Chloride in parts per million.

cfs = Delta outflow in cubic feet per second.

mmho = Electrical conductivity in millimhos per centimeter.

Source: Rich Kristof, U. S. Bureau of Reclamation, November 18, 1983.

Operation Studies

Environmental consequences of the Proposed Action and the No Action alternative were compared with the aid of computer simulations of project operations. Such simulations are commonly called operation studies. Operation studies require detailed sets of input data. Such data sets were available for the 1980 and 2020 levels of development. The "level of development" concept is related to demand for water, not with development of project facilities.

In preparing this report, operation studies were performed for the 1980 level of development, to approximately represent the present, and for the 2020 level of development, which is considered "ultimate" for planning purposes. In both sets of studies, only existing project facilities were recognized. The 1980-level studies were based on observed historical hydrology for the period October 1921 through September 1978. The 2020-level studies were based on observed and estimated hydrology for the period October 1894 through September 1971. The differing periods were used because work on operation studies was split between the Department and the Bureau, and each agency has its own computer model. The Department performed the 1980-level studies, and the Bureau performed the 2020-level studies.

Proposed Action

Conditions indicated by the operation studies to exist if the proposed Coordinated Operation Agreement were executed and in effect are described below by comparison to the No Action cases.

No Action, Case A

In this case, where during critical years both the CVP and SWP are operated only to meet the Tracy standards, Delta

outflow during balanced water conditions would be reduced as compared to outflow under the Proposed Action. There would be a corresponding reduction in Delta water quality (increase in salinity). As an example, Figure 3 (derived from the 1980-level studies) compares projected Delta outflow for calendar year 1977. Figure 4 translates the outflow levels of Figure 3 into projected water qualities at Emmaton, on the Sacramento River.

The reduction in Delta outflow would mean that the CVP and SWP would have more water at their disposal for purposes other than maintaining water quality in the Delta. Some or all of this increment in supply (as compared to the supply that would be available under the Proposed Action) could be delivered to project water users or, alternatively, could be retained in reservoir storage. If retained in storage, the water would serve as additional reserve against the possibility of continued drought. The amount of comparative increase in storage would depend on naturally occurring hydrology for the year or years in question. Continuing with the example based on 1977 hydrology, Figure 5 shows the projected storage increments the CVP and SWP would gain or retain by operating to the Tracy standards rather than those of Exhibit A.

Retaining more water in storage would mean that at times less water would be released to rivers downstream from project reservoirs. Completing the example based on 1977 hydrology, Figures 6, 7, and 8 compare projected monthly flows with both projects meeting Exhibit A to monthly flows with both projects meeting the Tracy standards.

No Action Cases A, B, and C; Critical Period Analysis

The capabilities of the CVP and SWP are usually measured by their performance through the "critical period", a series

FIGURE 3: PROJECTED DELTA OUTFLOW

PROPOSED ACTION NO ACTION-CASE A

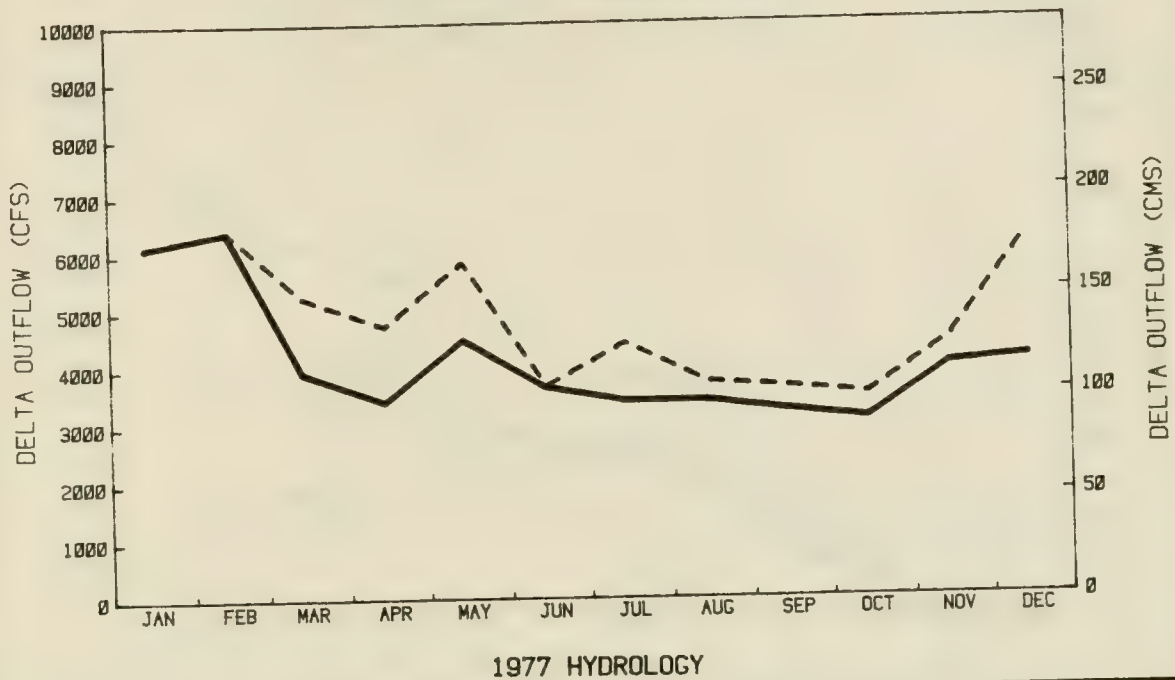


FIGURE 4: PROJECTED SALTS - SACTO R. AT EMMATON

PROPOSED ACTION NO ACTION-CASE A

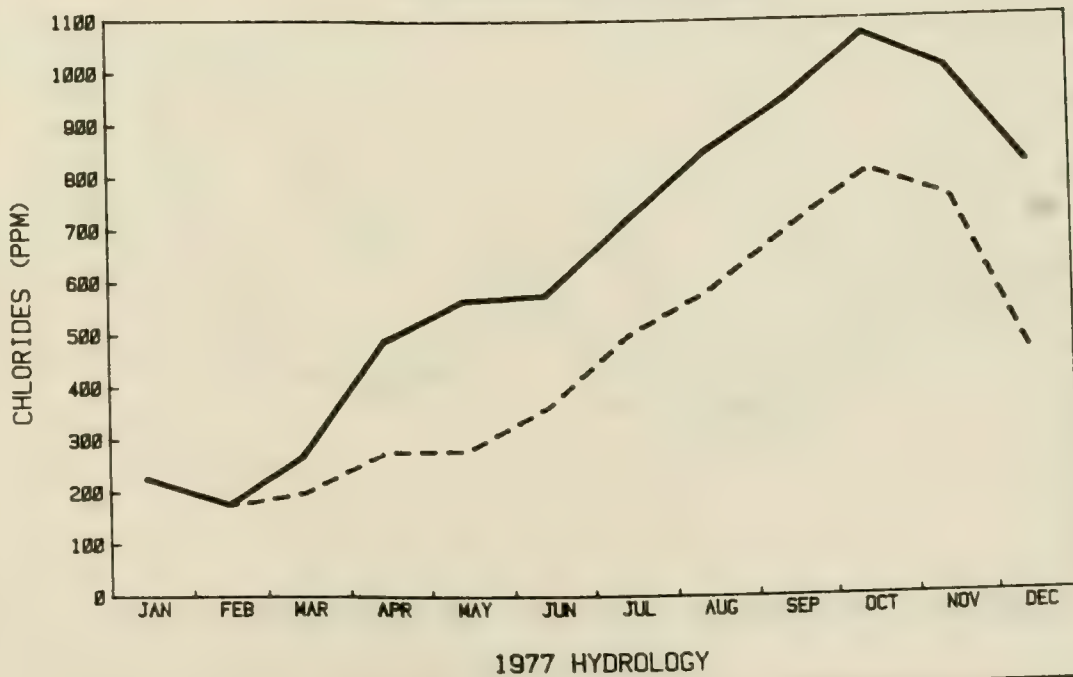


FIGURE 5: STORAGE GAINED IN NO ACTION,
CASE A (VS. PROPOSED ACTION)

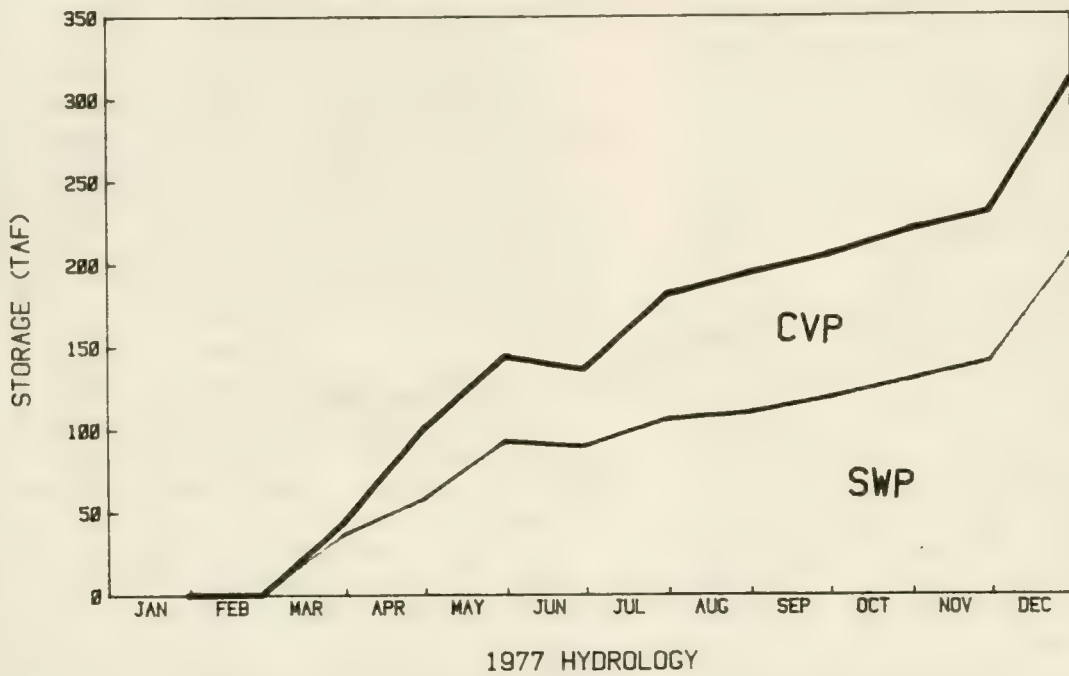


FIGURE 6: PROJECTED FLOW-SAC R. AT CHICO LANDING

PROPOSED ACTION NO ACTION-CASE A

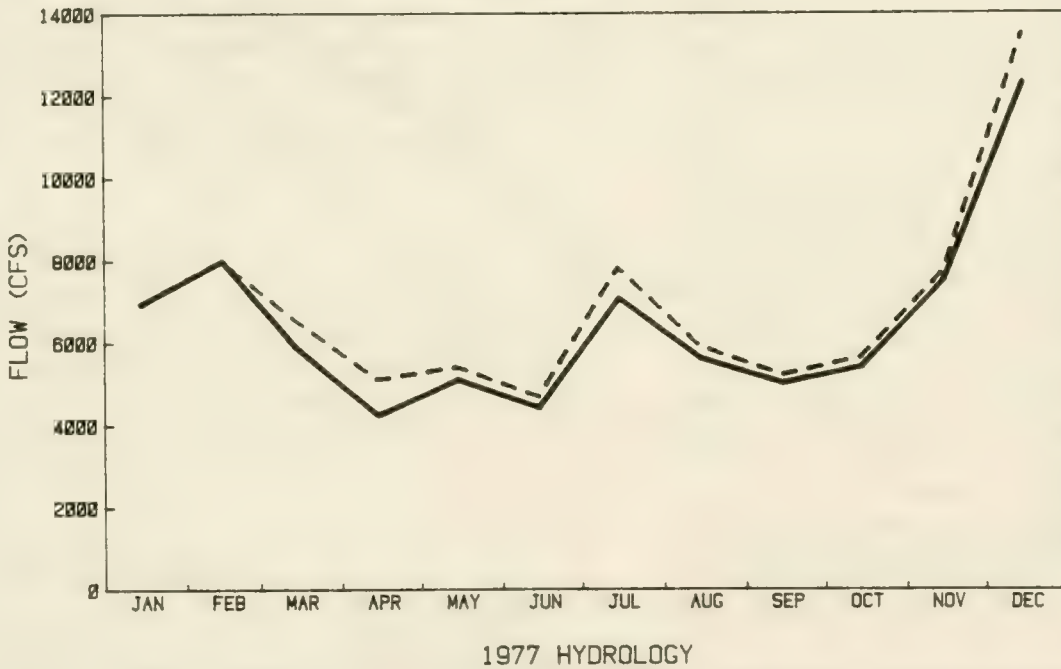


FIGURE 7: PROJECTED FLOW-FEATHER R. AT THERMALITO

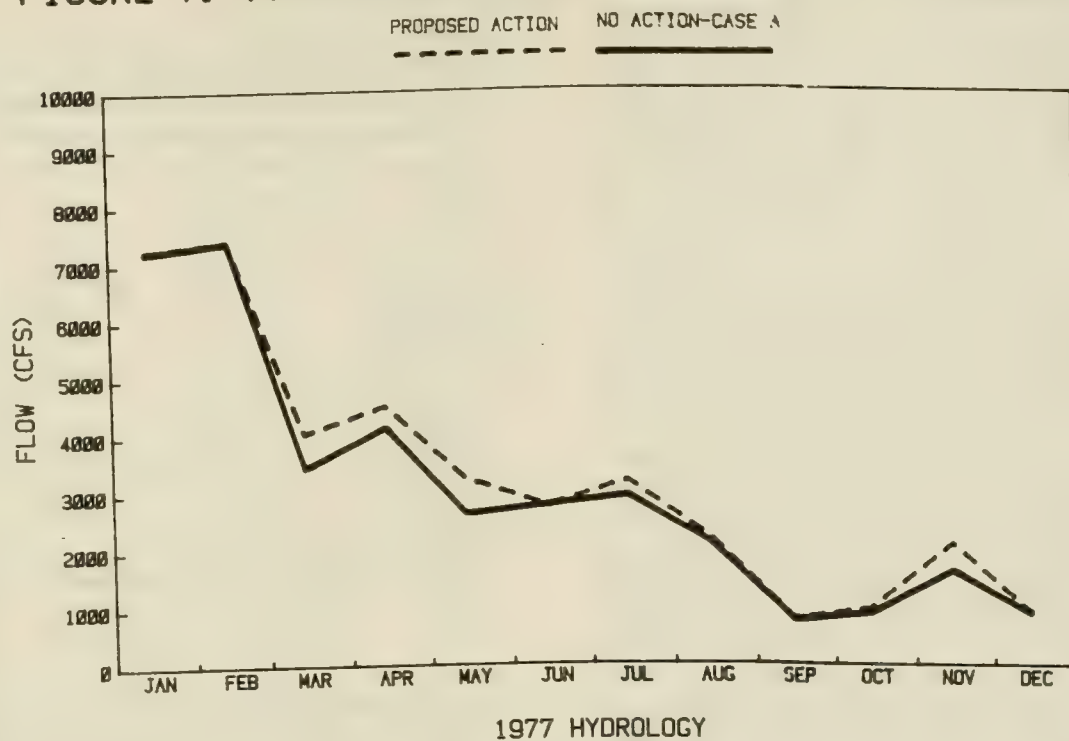
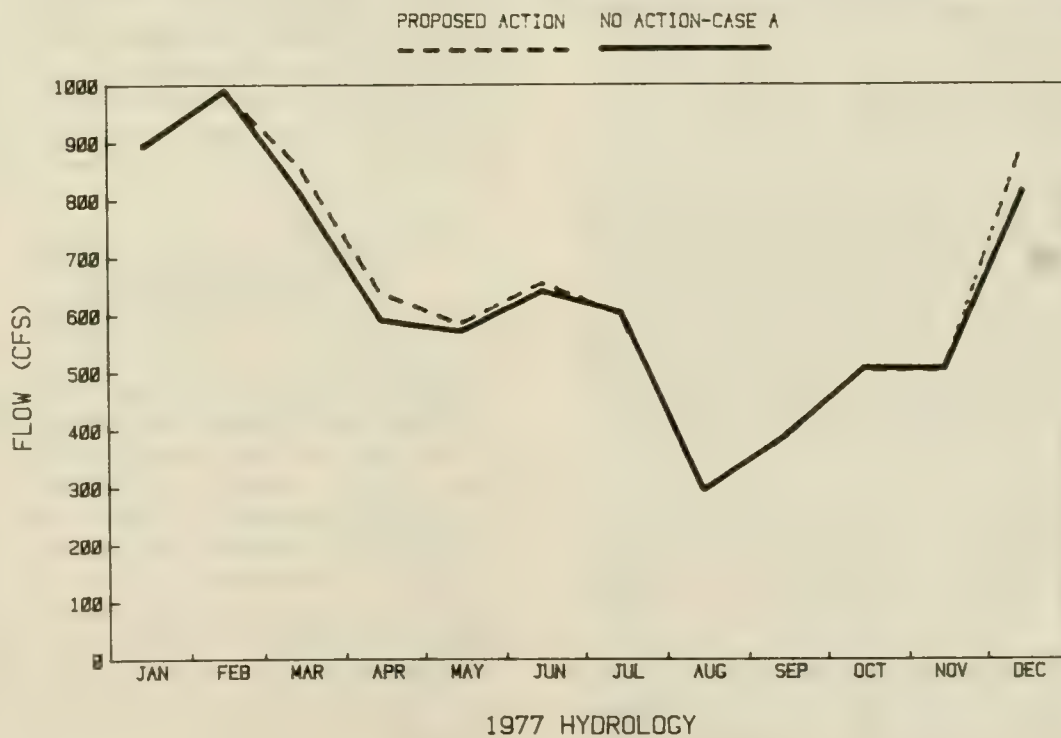


FIGURE 8: PROJECTED FLOW-AMERICAN R. BELOW NIMBUS



of dry and critical years spanning 1928-1934. The natural hydrology observed during this period is assumed to recur, and operation of CVP and SWP facilities, along with other factors affecting the disposition of water supplies, are superimposed on it. This technique was used to compute the CVP and SWP water supplies for Exhibits B-1 and B-2 of the proposed Agreement.

Operation study results (1980-level) comparing the Proposed Action to the three cases of the No Action alternative through the critical period are presented in Table 4 (compare to Table 2). The study was based on the period March 1928 through February 1935, with each of the 12-month periods beginning with March 1931 assumed as critical years in which the CVP, the SWP, or both would operate for Tracy standards in the absence of the Coordinated Operation Agreement (that is, in the No Action alternative).

The study showed that with both projects operating for Tracy standards in the critical years (No Action, Case A), the Delta outflow requirements of Exhibit A would be shorted by 2,273,000 acre-feet over the period. As a result, the projects would be able to retain 1,905,000 acre-feet more water in reservoir storage.

If the SWP were to continue operating as if Exhibit A standards controlled in the Delta while the CVP operated for Tracy standards (No Action, Case B), about half of the deficiency in outflow needed to meet Exhibit A would be made up, and all of the increment in residual SWP storage observed in Case A would be eliminated.

Operating the SWP to meet Exhibit A requirements in full while the CVP was operating to meet Tracy standards only (No Action, Case C) would cost the SWP water users 983,000 acre-feet of their SWP supply over the period. If, under this scenario, the SWP were operated in all years in a manner that anticipates

Table 4
DISPOSITION OF WATER IN 7-YEAR CRITICAL PERIOD,
1928 TO 1935
PROPOSED ACTION VERSUS NO ACTION*
(Increase or Decrease from Proposed Action,
in Thousand Acre-Feet)

<u>Alternative</u>	<u>Storage</u>		<u>Export</u>		<u>Required Delta Outflow</u>
	<u>SWP</u>	<u>CVP</u>	<u>SWP</u>	<u>CVP</u>	
Proposed Action	0	0	0	0	0
No Action					
Case A	+1,118	+717	0	0	-2,273
Case B	0	+717	0	0	-1,071
Case C	0	+679	-983**	0	0

EXPLANATION:
Case A -- CVP and SWP meet Tracy standards.
Case B -- CVP meets Tracy standards;
SWP releases its share of Exhibit A.
Case C -- CVP meets Tracy standards;
SWP meets Exhibit A in full.

* Based on 1980-level operation studies.
** About 143,000 acre-feet on a firm annual yield basis. This value includes adjustments for carriage water releases, unregulated flows, and stored supplies.

the possibility of a critical year in which the CVP would honor Tracy standards only, firm annual water supply deliveries by the SWP to its contractors would have to be cut by about 143,000 acre-feet.

Environmental Comparison
of Alternatives
(Proposed Action vs. No Action)

In general, from an environmental point of view, the Proposed Action would help to protect the Delta and existing water uses there; however, operation of CVP facilities to meet the Delta standards of the Proposed Action's Exhibit A in critically dry years could exacerbate a problem of river temperatures sometimes being too warm for successful spawning and rearing of salmon, particularly in the upper Sacramento and Trinity rivers.

The most environmentally significant aim of the Proposed Action is to commit both the SWP and CVP to meeting the Exhibit A Delta standards of the Agreement. This commitment would be undertaken by both the Bureau and the Department to protect the Delta environment. Available information indicates that the Exhibit A standards would indeed be more effective in protecting the Delta than would the alternative Tracy standards in critical years. In other years, the Delta would receive protection equal to that of the Exhibit A standards with or without the Proposed Action. That the Exhibit A standards would be more protective in critical years should not be surprising, because the Exhibit A standards are the same (at least as far as the Delta is concerned) as the Decision 1485 standards of the State Water Resources Control Board.

The greater protection afforded to the Delta by the Exhibit A standards of the Proposed Action would be observable (during critical years) in:

- ° Significantly better water quality at the Rock Slough intake of the Contra Costa Canal. This would help to assure that poor water quality would not impair industrial production. It would also help to assure adequate quality for municipal water users in eastern Contra Costa County.
- ° Significantly better water quality for agriculture in the western Delta.
- ° Water qualities suitable for striped bass spawning in the lower San Joaquin River, where up to 45 percent of the striped bass population of the Delta-Bay estuary spawns.
- ° Ample Delta outflow to maintain an entrapment zone favorable to growth and survival of young striped bass.
- ° Reduced diversion of striped bass eggs and larvae, and of young salmon, when pumping restrictions are in effect during May, June, and July (compared to unrestricted pumping).

The Exhibit A standards would also provide better quality water to Suisun Marsh than would be provided in critical years with the Tracy standards controlling. The better quality of water would have a significant favorable effect on natural production of waterfowl food in the marsh.

The greater protection afforded to the Delta and Suisun Marsh by the Exhibit A standards would be provided by releasing more water from project reservoirs for Delta use and outflow. Such releases, combined with releases for all other demands and purposes, could draw down water levels in the reservoirs during dry periods. Whether reservoir levels with the Exhibit A standards being met during critical years would be any lower than they would be with some less demanding Delta standards being met, such as the Tracy standards, depends on what the project operators would do with the water they could save by meeting the less demanding Delta standards. If they kept the water in the reservoirs, the reservoirs would be maintained at higher levels. Higher water levels in the CVP's Shasta, Clair Engle, and Folsom lakes would mean cooler water could be released to the Sacramento, Trinity, and American rivers downstream from these reservoirs. The cooler water in critical years would significantly improve conditions for spawning and rearing of chinook salmon, a fish species of high sport and commercial value. Thus, it is an adverse impact of the Proposed Action that a project capability to provide water temperatures cool enough for successful salmon spawning and rearing would be lessened by the Bureau's commitment to meet the Exhibit A Delta standards in all years. However, based on operation studies covering 83 years of record (1895-1977), this adverse impact would occur in only about 3 years out of 83, which is a frequency of occurrence of less than 4 percent.

Another possible adverse impact of the Proposed Action, as compared to No Action, could occur in San Francisco Bay. Delta outflow surges in critical

years (if any) and in the years immediately following critical years could be smaller or less numerous with the Proposed Action, because the projects would have more capacity available for storing runoff from major storms. The operation studies used to compare Proposed Action to No Action give only monthly flows and are therefore not usable for differentiating among alternatives in regard to outflow surges. If differences in surges could be identified, they would be small and infrequent (historically, 3 in 83 years). It should be recognized that such differences may not occur at all under different operating assumptions. Most important, it is judged more beneficial to the estuary in the long term to meet these standards than not to meet them.

In No Action, Case A, in which both the CVP and SWP are operated to meet the Tracy standards in critical years, a lesser degree of protection would be afforded to the Delta. This lesser degree of protection would be observable in:

- ° Lower water quality at the Rock Slough Intake of the Contra Costa Canal. The maximum of 500 ppm TDS recommended by the Environmental Protection Agency for drinking water would sometimes be exceeded, as would the EPA-recommended maximum of 250 ppm chloride. Industry in eastern Contra Costa County would be adversely affected by chloride in excess of 150 ppm that would persist longer than with the Proposed Action.
- ° Lower water quality for agriculture in the western Delta. Crop yield declines (compared to yields obtainable with the Exhibit A standards) would be expected.
- ° Salinity levels in the lower San Joaquin River above the levels at which striped bass prefer to spawn.
- ° Delta outflows insufficient to maintain an entrapment zone in the Suisun Bay area. Resulting decreases in

Neomysis and young striped bass abundance would be expected.

- ° A possibility for increased reverse flow in the lower San Joaquin River, drawing more fish into the export pumps.
- ° Reduced spring flows in the Sacramento River, adversely affecting out-migrant juvenile salmon.

All of the adverse effects in the Delta observed in No Action, Case A, would be eliminated in No Action, Case C, where the SWP cuts exports to assure maintenance of Exhibit A and Decision 1485 standards. However, each year the SWP would lose about 140,000 acre-feet of yield worth over \$28 million, based on least-cost alternative sources. In No Action, Case B, all effects in the Delta would be intermediate between the Proposed Action and No Action, Case A.

In all the No Action cases, temperatures for salmon spawning and rearing in the Sacramento, Trinity, and American Rivers could (but not necessarily would) be maintained at more favorable temperatures than could be maintained with the Proposed Action in critically dry years. Also, water in Shasta, Clair Engle, and Folsom lakes could be maintained at higher levels, which would be good for resident fish and reservoir recreation. This water level effect would be observed at the SWP's Lake Oroville only in No Action, Case A.

As stated above, the analysis of the No Action alternative was based on operation studies in which it was assumed that any water that either project might save by meeting only the Tracy standards in the Delta rather than the Exhibit A standards would be retained in the reservoirs.

If the projects delivered water to their contractors in lieu of retaining it in storage, the environmental differences between the Proposed Action and No Action would be eliminated where rivers

and reservoirs are concerned. Thus, the same temperature control problems in the rivers below major CVP reservoirs that were described for the Proposed Action would also exist in No Action. In the Delta, the environmental differences between Proposed Action and No Action would be as great or greater if the project operators delivered any water they could save by meeting only the Tracy standards, because more water could be exported. Increased exports would exacerbate all the environmental problems, such as reverse flows and fish entrainment, that are associated with project exports. Thus, the environmental drawbacks described for the No Action alternative in the Delta could be made worse.

To determine how much more water CVP and SWP contractors could get if the difference between the Tracy and Exhibit A standards were delivered rather than retained in storage, estimates were based on the numbers in Table 4. If both projects operated in a manner that assumed realization of the No Action Case A scenario in critical years, firm annual yield increases of about 130,000 acre-feet for the CVP and about 200,000 acre-feet for the SWP could be achieved. Such increases could be of significant economic benefit to the contractors of both projects.

Preferred Alternative

Relative advantages and disadvantages of alternatives are summarized in Table 5.

Alternative 1, the Proposed Action, is the alternative preferred by the U. S. Bureau of Reclamation and the Department of Water Resources. This alternative is preferred because:

- ° It is an available and implementable option.

- ° It would resolve issues between the State and Federal Governments concerning the respective water supplies of the State Water Project and Central Valley Project.
- ° It would facilitate efficient operation of the two water projects.
- ° It would afford protection to the water-related environment in the Delta.
- ° It would provide a basis for orderly planning and continuing development of the two projects.

No alternative to the Proposed Action, other than No Action, represents an available and implementable option. No Action has potential to have certain environmental advantages over the Proposed Action because the CVP water that would be committed to use in meeting the Delta standards in critical years with the Proposed Action would remain uncommitted and therefore potentially available to help control river temperatures below CVP reservoirs. However, in No Action, there is no assurance that the uncommitted water would be used to help control river temperatures.

Executing this draft Coordinated Operation Agreement of the Proposed Action would not eliminate the possibilities to obtain agreement on matters that go beyond its scope.

Mitigation Measures

The Agreement provides overall resource level protection. The Exhibit A standards of the Proposed Action are mitigation themselves for the projects. There is no proposed mitigation for the Proposed Action beyond the Exhibit A standards.

Table 5

RELATIVE ADVANTAGES AND DISADVANTAGES OF REASONABLE ALTERNATIVES

Alternatives	Advantages	Disadvantages*
Proposed Action (Compared to No Action)	Better overall protection for migratory fish in the Delta during critically dry years. Higher potential agricultural productivity in the western Delta during critically dry years. Higher productivity of waterfowl food in Suisun Marsh during critically dry years. Higher water quality for M&I use in the Delta during critically dry years.	Potential for increased drawdown at CVP reservoirs during critically dry years, with minor adverse effects on esthetics and recreation. Potential local adverse effects on salmon spawning and rearing due to high river temperatures during late summer and fall months of critically dry years. Potential for slightly reduced Delta outflow peaks in the year or years immediately following critically dry years.
No Action, Case A ** (Compared to Proposed Action)	Retains existing CVP option to reserve portion of water stored in reservoirs for maintaining river temperatures suitable for salmon spawning in late summer and fall of critically dry years. Disadvantages of Proposed Action avoided if water saved by meeting less demanding Delta standards is retained in storage.	Advantages of Proposed Action foregone.
No Action, Case B ** (Compared to Proposed Action)	Same as Case A	Advantages of Proposed Action foregone, but to a lesser degree than in Case A.
No Action, Case C ** (Compared to Proposed Action)	Same as Proposed Action	Firm water supply yield of SWP reduced by 143,000 acre-feet.
Modified Agreement (Compared to Proposed Action)	Potential for increased flexibility.	Modifications were not found to be acceptable to the reasoning and trial and error negotiations.
No Coordination (Compared to Proposed Action)	None	Decrease in environmental protection and in reliability of project yields.

* No impacts were judged to be significant based on CEQA criteria listed in Appendix K.

**Case A = CVP and SWP meet Tracy standards.

Case B = CVP meets Tracy standards; SWP releases its share of Exhibit A.

Case C = CVP meets Tracy standards; SWP meets Exhibit A in full.

Chapter 4. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The affected environment, where environmental consequences attributable in some way to the proposed Coordinated Operation Agreement might occur, includes the river systems and reservoirs where project water supplies originate; the Delta, where the affected waters mingle; and the service areas, where project water is used. Potential consequences in each of these areas are discussed in this chapter with respect to the Proposed Action and No Action. As discussed in Chapter 3, there are three possible cases for the No Action alternative. Each case will be evaluated separately except when there are no differences in impacts. Environmental consequences were considered as the differences -- especially any adverse differences -- between the environmental conditions that would be expected to exist under these two alternatives.

As discussed in Chapter 3, the two projects could and might be operated in the same way whether the Proposed Action is taken or not. With no differences in operations, there would be no differences in environmental conditions. However, in critical years the projects could be operated differently in No Action than they would be in the Proposed Action. The environmental analysis of Proposed Action versus No Action in this chapter is based on operation studies designed to bring out potential environmental differences between the Proposed Action and No Action. For a discussion of the operation studies, see Chapter 3.

Regional Setting

The Proposed Action and No Action are considered within the context of the State of California, the Central Valley basin, and the two largest water development projects in that basin: the

Central Valley Project (CVP) and the State Water Project (SWP).

Central Valley Basin

The proposed Agreement deals with the management of riverflows in the Central Valley basin of California and with the distribution of water supplies in the basin and from the basin by the Central Valley Project and the State Water Project.

The Central Valley basin comprises the 450-mile-long Central Valley and the surrounding upland and mountain areas draining into it. The area encompasses some 60,000 square miles, or about 40 percent of California. The valley portion, generally flat below an elevation of 400 feet, is an alluvial plain varying from 40 to 60 miles in width. It has been developed extensively for agriculture. The climate is hot in summer and mild in winter. This, combined with the deep alluvial soils, allows high farm productivity, but irrigation is required.

The northern half of the Central Valley, the Sacramento Valley, is drained by California's largest river system, the Sacramento. Major tributaries include the McCloud, Pit, Yuba, Feather, and American rivers.

The southern half of the Central Valley, the San Joaquin Valley, has two sub-basins. The northern part drains via the San Joaquin River; the southern part, called the Tulare Lake basin, drains internally except in rare instances when floodwaters overtop a low divide and flow into the drainage of the San Joaquin River. Major tributaries to the San Joaquin include the Merced, Tuolumne, and Stanislaus rivers.

Precipitation on the Central Valley basin is heavier in the more northerly areas and falls mostly from November through April. Except for thunderstorms in the mountain areas, summers are usually almost rainless throughout the region. Annual rainfall averages more than 10 inches everywhere in the Sacramento Valley, and rain or snowfall on surrounding mountains averages more than 60 inches annually over large areas. Averages are lower in the San Joaquin Valley and its surrounding mountains. Precipitation varies widely, however, from year to year, so average years are rare. Because a significant portion of precipitation in the basin occurs as winter snowfall in the mountains, runoff may lag precipitation, and the season of runoff often extends into late spring and summer as the winter snows melt.

Flood control and/or water storage works exist on all major streams in the basin, which alters the natural flow patterns. These facilities, including facilities of the CVP, SWP, Metch Hetchy, and Mokelumne River Aqueduct Project, save water for the dry season and protect lives and property against the winter floods that were common before water development. They also produce hydroelectric power, enhance recreation opportunities, and serve other purposes.

The area in the center of the Central Valley basin where the Sacramento and San Joaquin valleys merge coincides with a break in the coastal mountains bordering the basin on the west side. Here the Sacramento River, the much smaller San Joaquin River, and other streams meet in the Sacramento-San Joaquin Delta before flowing on toward the Pacific Ocean. This delta, unlike most river deltas, is wide landward and narrow seaward. It forms the upstream portion of an estuary that includes Suisun Bay, San Pablo Bay, and San Francisco Bay (see Affected Environment, Delta-Bay Estuary).

The CVP and SWP

The Central Valley Project, operated by the U. S. Bureau of Reclamation, extends the full length of the Central Valley basin. It has been developed from the 1930s through the present. The project supplies irrigation water, provides flood control, improves navigation, supplies domestic and industrial water, generates hydroelectric power, conserves fish and wildlife resources, provides recreational opportunities, and protects water quality. The CVP stores and develops surplus water supplies of the Sacramento, American, and Trinity rivers for use in the Sacramento River basin as well as the water-deficient lands in the San Joaquin Valley.

Lake Shasta on the Sacramento River and Folsom Lake on the American hold back runoff from winter storms and release it through the dry season to maintain riverflows higher than they would be under natural conditions. Clair Engle Lake likewise holds back winter runoff, but riverflows are usually significantly less than they would be under natural conditions. The Trinity River drainage is outside the Central Valley basin, but water from the Trinity is brought into the Sacramento River drainage through the Clear Creek Tunnel.

The CVP-controlled Sacramento River, augmented by water from the Trinity, supplies irrigated areas in the Sacramento Valley. At Sacramento, flows of the Sacramento River are augmented by flows entering from the CVP-controlled American River. A few miles downstream, the river enters the northern part of the Sacramento-San Joaquin Delta.

Some of the water entering the Delta takes a direct course toward Suisun Bay, and some finds its way into the interior Delta through the CVP's Delta Cross Channel and natural channels. Thus, releases from CVP reservoirs augment the supply of fresh water in the Delta during the drier times of the year.

Among the diverters of the fresh water available in the Delta is the CVP, which pumps water from the southern Delta at its Rock Slough and Tracy pumping plants. The Rock Slough pumping plant serves the Contra Costa Canal, providing water mainly to municipal and industrial users in parts of Contra Costa County. The Tracy Pumping Plant serves the Delta-Mendota Canal, which conveys water to agricultural users in the San Joaquin Valley and to facilities of the CVP's San Luis Unit. Some of the water provided in the San Joaquin Valley is delivered on an exchange basis to areas that used water from the San Joaquin River before construction of the CVP.

Flows of the San Joaquin River are controlled and stored by the CVP's Friant Dam and Millerton Lake. These facilities, in foothills above Fresno, allow diversion of a major portion of the flows of the San Joaquin River into the Friant-Kern Canal, a CVP facility that conveys water along the eastern periphery of the Tulare Lake basin to agricultural areas as far south as Bakersfield. A lesser portion is diverted into the Madera Canal, which serves certain areas in the San Joaquin Valley.

The CVP's San Luis Unit shares San Luis Reservoir and the San Luis Canal with the State Water Project. The reservoir stores excess flows pumped from the Delta in the winter and spring, and the San Luis Canal delivers water from the reservoir and the Delta-Mendota Canal to agricultural areas along the west side of the San Joaquin Valley in the Tulare Lake basin and in the region of transition between that landlocked basin and the drainage of the San Joaquin River.

The existing facilities of the Central Valley Project provide full, supplemental, or temporary water supply to about 3 million irrigable acres. They also provide 154,000 acre-feet of water for municipal and industrial use and generate over 3.5 billion kilowatt-hours of electricity annually in addition to

supplying the energy needs of project facilities.

The State Water Project, built and operated by the Department of Water Resources, is similar in some ways to the Central Valley Project. Both projects store runoff in the Sacramento Valley basin, release stored water to the Sacramento River and the Delta, and pump water out of the southern Delta for delivery to water users to the south and west. The State Water Project's storage facilities are on the Feather River, and its facilities for distributing water from the Delta extend farther south than those of the CVP.

The uppermost facilities of the SWP are three small lakes -- Davis, Frenchman, and Antelope -- located high on separate forks of the Feather River. The forks meet at Oroville Reservoir, the project's principal storage facility. Water released from Oroville is used to generate electrical power in the Hyatt-Thermalito complex just downstream. Below the Thermalito Afterbay outlet, releases continue down the Feather River, which joins the Sacramento River 21 river miles above Sacramento. Here waters managed by the SWP mingle with and become indistinguishable from the waters of the CVP. Water from the two projects flows commingled into the Delta.

In the southern Delta, the SWP operates Harvey O. Banks Delta Pumping Plant and Clifton Court Forebay. The forebay takes in Delta water as the high tide recedes; then its gates are closed, and the pumping plant pumps from the forebay. The pumps lift the water to the beginning of the 444-mile California Aqueduct and to another pumping plant at the beginning of the South Bay Aqueduct, which serves the southern San Francisco Bay area. The California Aqueduct continues along the west side of the San Joaquin Valley to the Federal-State San Luis Reservoir, and then along the west side of the southern San Joaquin Valley in the Tulare Lake basin, where most of

the SWP's agricultural water customers are located.

Leaving the Central Valley basin, the California Aqueduct rises 2,700 feet in a series of pump lifts to climb over the Tehachapi Mountains. On the other side, the aqueduct splits into a long East Branch and a shorter West Branch, both of which take SWP water to the project's predominantly urban customers in parts of Southern California.

Some ways in which the CVP and SWP differ include the ratio of urban to agricultural water users served by each project and the yields and storage capacities of the projects. Of the water now being delivered by the CVP, 95 percent goes to agricultural users. SWP water goes about equally to agricultural and urban use. Based on Exhibit B-2 of the proposed Coordinated Operation Agreement, the CVP's yield (water supply available to the project on a reliable basis) is nearly 100 percent higher than the SWP's if water deliverable both upstream from the Delta and as export from the Delta is counted, and 44 percent higher if only water deliverable as export is counted. The difference in yields derives partly from a difference in upstream storage capacities: the CVP's storage capacity in Clair Engle, Shasta, and Folsom Reservoirs totals 8 million acre-feet, while the capacity of the SWP's single significant upstream storage facility at Oroville is 3.5 million acre-feet. Due to its lesser upstream storage, the SWP relies more than the CVP on exporting surplus unstored flows available in the Delta during winter and spring.

Another significant difference between the two projects lies in their respective capacities for export from the Delta. The CVP can pump a maximum of 4,600 cubic feet per second (cfs) into the Delta-Mendota Canal. Adding the Contra Costa Canal brings CVP export capacity to 4,950 cfs. The SWP can pump 6,400 cfs at the Banks Pumping Plant. With its greater export capacity, the

SWP is in a better position to take advantage of surplus flows when they are available in the Delta. Even so, the SWP will have to construct additional facilities, both in the Delta and elsewhere, to satisfy obligations coming due under existing contracts.

Affected Environment, Delta-Bay Estuary

The Delta-Bay estuary (Figures 9 and 10) is the Delta of the Sacramento and San Joaquin rivers plus Suisun and San Francisco bays. The estuary connects its two principal tributary rivers and the Calaveras, Mokelumne, and Cosumnes rivers to the Pacific Ocean. These rivers drain the Central Valley basin.

Hydrology and Water Use

Some of the water reaching the Delta is used there and some is withdrawn for use elsewhere (exported). What remains flows into Suisun Bay, then into San Francisco Bay (including San Pablo Bay), and then to the ocean. The latter parts of this sequence may exist more in logic than in observable reality most of the time, because tidal influences tend to overwhelm fresh water flows once they get beyond the Delta. Summer and fall Delta outflows generally range between 5,000 and 10,000 cubic feet per second (cfs), while the tides at the western boundary of the Delta flow at a rate of 200,000 cfs.

On the average, about 21 million acre-feet of water reaches the Delta annually, but actual inflow varies widely from year to year and within the year. In 1977, a year of extraordinary drought, Delta inflow totaled only 5.9 million acre-feet; while inflow for 1983, an exceptionally wet year, was about 70 million acre-feet. On a seasonal basis, average natural flow to the Delta varies by a factor of more than 10 between the highest month in winter or spring and the lowest month in fall.

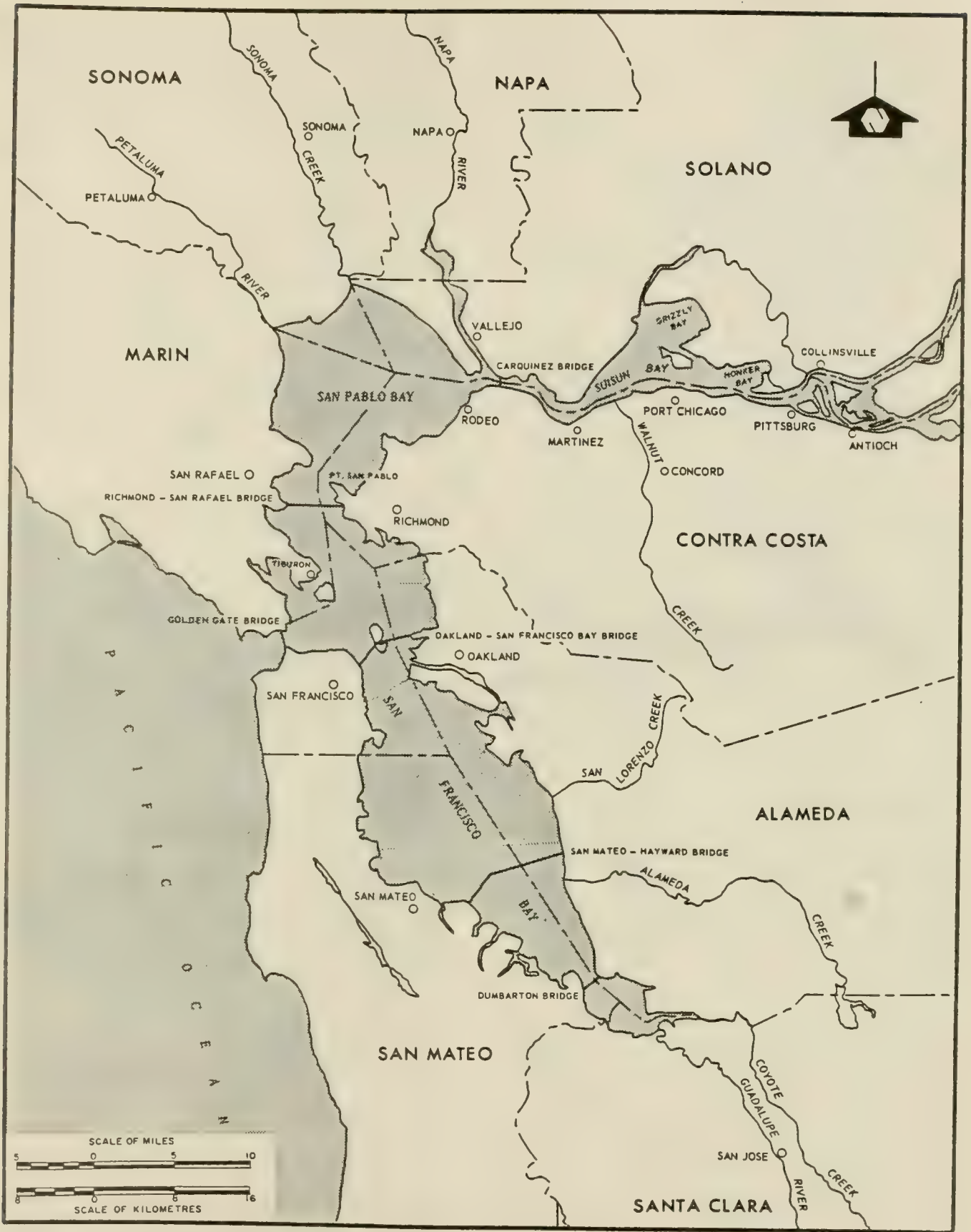


Figure 9. SAN FRANCISCO BAY COMPLEX.

LEGEND

- 1 - SUISUN BAY
- 2 - SUISUN MARSH
- 3 - CHIPPS ISLAND
- 4 - EMMATON
- 5 - JERSEY POINT
- 6 - H.O.B. DELTA PUMPING PLANT
- 7 - TRACY PUMPING PLANT
- 8 - CLIFTON COURT FOREBAY
- 9 - CALAVERAS RIVER
- 10 - PRISONERS POINT
- 11 - SAN ANDREAS
- 12 - TERMINOUS
- 13 - MOKELUMNE RIVER
- 14 - COSUMNES RIVER
- 15 - CITY OF VALLEJO INTAKE



FIGURE 10: SACRAMENTO - SAN JOAQUIN DELTA

Water from the Delta supplies farms and cities in the local area, and the CVP and SWP rely on the Delta for water they provide to service areas comprising one-third of the land area of California and two-thirds of its population.

If a year of average inflow should occur in the mid-1980s, about 10 percent of the water reaching the Delta would be withdrawn for local use, 30 percent would be withdrawn for export by the two projects, 20 percent would be needed for salinity control, and the remaining 40 percent would become Delta outflow in excess of minimum requirements. The excess outflow would occur almost entirely during the season of high inflow.

Salinity control is necessary because the Delta is contiguous with the ocean, and its channels are at or below sea level. Unless repelled by continuous seaward flow of fresh water, sea water will advance up the estuary into the Delta and degrade water quality. During winter and early spring, flows through the Delta are usually above the minimum required to control salinity (the situation described as "excess water conditions" in Chapter 2); but at least for a few months in summer and fall of most years, salinity must be carefully monitored and controlled ("balanced water conditions" as described in Chapter 2).

The monitoring and control is provided by the CVP and SWP and regulated by the State Water Resources Control Board (State Board) under its water rights authority. Coordination of CVP and SWP salinity monitoring and control functions has been arranged on an annual basis in the past and would be accomplished for the long term by the proposed Coordinated Operation Agreement.

Protective Standards

The State Board promulgates water quality and outflow standards for the Delta-Bay estuary. Its current

standards are contained in Water Right Decision 1485 (1978). That decision orders the Central Valley Project and State Water Project to operate their facilities so as to guarantee certain conditions, most of which were described in terms of electrical conductivity or chloride (both measures of salinity). Separate categories of standards were specified to protect agriculture, municipal and industrial use, and fish and wildlife.

In Decision 1485, the State Board declared:

"The underlying principle of these standards is that water quality in the Delta should be at least as good as those levels which would have been available had the state and federal projects not been constructed, as limited by the constitutional mandate of reasonable use."

In applying this principle, the State Board considered as its mandates:

- ° Protection of vested water rights.
- ° Protection of the public interest.

According to the State Board, the decision that resulted,

"... deals with a limited resource and involves essentially the allocation of water shortages", and
"... provides a reasonable level of protection to all uses of Delta supplies, recognizing the severe consequences if upstream supplies are exhausted."

The water quality and flow standards included in the proposed Coordinated Operation Agreement as Exhibit A are the same as those of Decision 1485 except that certain standards for Suisun Marsh, on the north side of Suisun Bay, are omitted. The omitted standards became effective on October 1, 1984. These standards were discussed under "Modified Agreement" in Chapter 3.

Freshwater outflow from the Delta to San Francisco Bay is believed to be important to maintaining desired environmental conditions in the bay, but no standards govern such outflow. High volume, uncontrolled outflow surges during the winter cause fresh water to penetrate well into the central bay, from which it can enter the southern bay by tidal exchange. Such events cause salinity stratification in much of the South Bay that can persist for several weeks or months following the initial appearance of fresh water.

In Decision 1485, the State Water Resources Control Board emphasized that consideration must be given to the outflow needs of the bay and directed that studies to investigate these outflow needs be initiated by October 1979. The studies are in progress, and their results will be considered when the State Board reviews Decision 1485. In the meantime, the Board has offered an interim policy guideline that calls for Delta outflow surges of at least 10,000 cubic feet per second for 5- to 10-day intervals about four times a year in most years and at least once a year during drier periods.

Delta Agriculture

The Delta, a 700,000-acre region of low-lying land and waterways at the landward end of the estuary, is mainly farmland. Prior to development, which began in the mid-19th century, the Delta was mainly tule marsh and grassland, with some high spots rising to a maximum of about 10 to 15 feet above mean sea level. Settlers soon discovered that tracts of Delta land could be productively farmed if dikes were built to protect them from tidal inundation. Crops grew well in the deep peat soils left by thousands of years of tule growth and decay.

Gradually, through the latter half of the 19th century and the early part of the 20th, the low dikes of the early

Delta farmers became a system of levees that now protect about 510,000 acres of farmland on 60 major islands and tracts. There are now about 1,100 miles of levees, some standing 25 feet high and reaching 200 feet across at the base /8/.

Behind the levees, peat soils have subsided over the years due to complex and interrelated factors, including oxidation, shrinkage, and soil loss by wind erosion. As a result, some of the island surfaces now lie more than 20 feet below mean sea level and as much as 30 feet below high-tide water levels in surrounding channels. This puts much of the Delta under an unrelenting threat of inundation, especially since many Delta levees are structurally unstable.

All of the major tracts and islands have been flooded at least once since their original reclamation, and a few have been allowed to remain flooded. Delta lands in the areas of deep peat soil, where subsidence has been greatest, are expensive both to protect from inundation and to reclaim from inundation once they are flooded. Reclamation may not be economical in some instances /9/.

The Delta is an important agricultural area of California and of the United States. Historically, the area was noted for its truck crops, such as asparagus, potatoes, and celery, but since the 1920s there has been a shift toward lower-valued field crops. Corn, grain, hay, and pasture currently account for more than 75 percent of the region's total production. The change has been attributed mainly to market conditions, although technological change and changes in growing conditions have also played a role.

The Delta lies in several counties (agricultural statistics are compiled by counties, not by geographic regions), but it is estimated that the Delta produced \$314 million worth of agricultural commodities in 1979, which would be about 3-1/2 percent of the statewide

total for that year. California is the number one agricultural state.

As in the rest of California, farming in the Delta depends on irrigation. The irrigation water comes from the Delta channels, and with 700 miles of them weaving through the region, no field is far from a water source. Lying at sea level and contiguous with San Francisco Bay, the channels are always filled with water, but the quality of that water is not necessarily assured. Water quality is one of the historical water problems in Delta agriculture (the other major ones being flooding and drainage), and water quality continues to affect farming practices and productivity in varying degrees, depending on location in the Delta and year-to-year hydrology.

Agriculture is one of the Delta water uses specifically protected by the State Water Resources Control Board standards of Decision 1485. The Exhibit A standards of the proposed Coordinated Operation Agreement would provide the same protection.

According to the environmental impact report written for Decision 1485, "the level of protection provided to Delta agriculture (by the standards) would be that which would have been available in the absence of the project". This does not mean water quality under Decision 1485 would be the same as without the projects -- it might sometimes be better, sometimes worse -- but rather that it would be functionally equivalent for agricultural purposes during the irrigation season, April 1 to August 15. The scope of protection for agriculture in Decision 1485 excludes the southern Delta. The Board found, "the SWP and CVP facilities covered by the permits before the Board in this proceeding do not appear to have a direct impact on water quality conditions in the southern Delta."

The water quality standards listed under the "Agriculture" heading of Exhibit A

are based on a determination by the State Water Resources Control Board that irrigation water salinity of not more than 0.45 millimhos per centimeter EC is required to obtain full yield of corn in Delta organic soils. Corn was chosen as a representative crop of the region. Decision 1485, and hence Exhibit A, generally requires channel water salinity in agricultural areas of the Delta to be 0.45 millimhos or lower, but higher salinities are allowed for one or more of the following conditions: (1) late in the irrigation season, (2) western Delta, (3) other than "wet year".

In May 1983, the Department of Water Resources, the State Water Resources Control Board, the University of California, and the U. S. Salinity Laboratory completed a study to further define the water quality needs of corn in the Delta. The study, referred to as the "Corn Study", resulted in findings that corn growing in organic soils of the Delta is not as sensitive to salinity in irrigation water as was believed, nor does salinity necessarily concentrate in the root zone to the degree assumed in the formulation of Decision 1485. With subirrigation (which is common practice) and normal rainfall, irrigation water of 2.20 millimhos EC can be used; with below normal rainfall, irrigation water of 0.80 millimhos EC was found to be usable without yield loss. Poorer quality irrigation water was also found usable without yield loss, depending on rainfall, soil properties, leaching practices, irrigation techniques, and the elevation and salt concentration of the water table. Irrigation water of 1.9 millimhos EC was found usable without yield loss under "normal conditions" /10/.

Delta Municipal and Industrial Uses

The western Delta includes some important industrial areas in eastern Contra Costa County, and water from the Delta

supplies a number of cities within the region. Thus, local municipal and industrial use, apart from such use in areas that receive Delta export water, is a consideration in regard to any issue involving disposition of Delta water supplies or Delta water quality control.

Western Delta municipal and industrial water users obtain their supplies in two ways: directly from the channels, or from the Contra Costa Canal. The latter is a Central Valley Project facility that diverts from Rock Slough. The direct diverters obtain their supplies from the San Joaquin River and adjacent channels off the Contra Costa County shoreline in the Antioch-Pittsburg area, but they can also take water from the Contra Costa Canal if offshore water is unsuitable.

The Contra Costa Water District is the water distribution authority for the Contra Costa Canal, but it also diverts water directly from Mallard Slough, opposite Chipps Island, when the chloride ion content of the water there is 100 parts per million (ppm) or less (mean tidal cycle). Historical availability of water of this quality at Mallard Slough has varied from 0 days in the 1976-77 water year to 365 days in 1982-83. Average availability is about 140 days per year.

The only other direct municipal diverter is the City of Antioch, which diverts its total requirements from areas offshore and adjacent to the city whenever the chloride ion content of the water there at high-high tide is 250 ppm or less (of the four-tide cycle, this is the highest tide). The Environmental Protection Agency's Drinking Water Regulations under Public Law 93-523 recommend 250 ppm chloride as a maximum. Historical availability of this quality of water has varied from 0 days in 1976-77 to 365 days in 1982-83. Average availability is about 200 days per year.

The extensive industrial complex adjacent to the San Joaquin River in the Antioch-Pittsburg area is located there partly because of the availability of large quantities of water for processing and cooling. The industries have three possible Delta water sources:

- ° Water diverted directly from the San Joaquin River or New York Slough.
- ° Raw water purchased from Contra Costa Water District conveyed from Rock Slough via the Contra Costa Canal; or, in the Pittsburg area, pumped from Mallard Slough at the District's pumping plant.
- ° Treated water purchased from municipal purveyors who obtain their raw water from the Contra Costa Canal or a San Joaquin River diversion.

The estimated cost of water pumped directly from the industries' own offshore facilities was \$3 per acre-foot in 1981; raw water purchased from Contra Costa County Water District and conveyed through the Contra Costa Canal costs about \$10 per acre-foot, and treated water purchased from municipal purveyors costs about \$39 per acre-foot.

Companies with facilities in the Antioch-Pittsburg area include Louisiana Pacific, Dow Chemical Corporation, Johns Manville, Pacific Gas and Electric, U. S. Steel, Crown Zellerbach, and DuPont. Their operations require boiler feed water, cooling water, and process water. Pacific Gas and Electric uses far more Delta water than any other company, but only for once-through cooling in its power plants -- a use not much affected by salinity changes. Louisiana Pacific and Crown Zellerbach, paper products manufacturers located on the south shore of the San Joaquin River east of Antioch, are examples of the major industrial water users whose uses are sensitive to salinity. They both require process water of no more than 150 ppm chloride.

In Decision 1485, the State Board did not include standards to protect water quality off the shoreline of Contra Costa County, but instead chose to protect water quality for municipal and industrial use with standards for the Rock Slough intake of the Contra Costa Canal. The Board reasoned that the canal provided a satisfactory substitute for direct diversion.

Under Decision 1485, chloride content of the water at Rock Slough is required to be 150 ppm or less for a minimum of 155 days per year and may not exceed 250 ppm. Water for Contra Costa Canal is provided under a contract with the Bureau of Reclamation, but the contract contains no specific salinity criteria.

Although not protected by Decision 1485, usable water continues to be available for direct diversion in the Antioch-Pittsburg area, depending on prevailing hydrology. An operation study (DWR PCSTAGE, March 7, 1983) indicates that in conditions that would exist in the year 2000 if no additional Central Valley Project or State Water Project facilities are constructed, water of 250 ppm chloride or less will be available at Antioch an average of about 5 months per year. These would be months of relatively high runoff.

Fish

The estuary supports about 90 species of fish, of which the most important are the anadromous species chinook salmon, striped bass, sturgeon, American shad, and steelhead rainbow trout. All of these anadromous fish spend most of their adult lives either in the lower bays of the estuary or in the ocean. The Delta is a major nursery area for most of these species. Some species of fish reside in the Delta permanently, with the white catfish prominent among them. The larger fish represent the top of a food chain that extends down to tiny phytoplankton, with each link in the chain fulfilling a vital role.

Sport fishing is one of the major beneficial uses of the waters of the estuary. Commercial fishing within the estuary is much less important, being banned by law for major species such as striped bass and salmon. However, salmon migrating through the estuary account for about 80 percent of the commercial chinook salmon catch in ocean waters near San Francisco. These salmon have historically represented an annual return to the industry of \$5.24 million at 1982 prices. The sport fishery for salmon in the estuary was valued at \$10 million annually in 1982. The striped bass fishery, reserved exclusively for non-commercial anglers, was valued at \$39 million in 1982 /11/. Other fish in the estuary -- including catfish, black bass, crappie, and bluegill -- also contribute significantly to recreation opportunities and the local economy.

The Delta-Bay ecosystem is large, complex, and dynamic, so its workings are not and may never be completely understood. As regards the environmental requirements of the more abundant fish species, Chapter 4 of a September 1982, Department of Water Resources and Department of Fish and Game publication entitled "Draft EIR, Proposed Agreement to Manage Fish and Wildlife Resources, Sacramento-San Joaquin Estuary" summarizes the current state of knowledge. In general, fish in the Delta require certain amounts and qualities of water to migrate, spawn, grow, and survive. Flows provided by the Central Valley Project and State Water Project are partially responsible for support of many species. Some aspects of project operations are also detrimental to fish.

Striped bass, frequently used as an indicator of the health of the ecosystem, have been in decline since the early 1960s. Various hypotheses have been advanced to explain this decline. Some of the hypotheses link the decline to operation of the CVP and SWP, particularly to the increase in total diversion from the Delta since the

beginning of SWP operation and effects associated with that increase.

Whether or not project operations are responsible for the striped bass decline, they certainly have an important role in controlling key factors that affect the ecosystem, particularly water quality and flows in the Delta. The rate at which the projects are exporting water from the southern Delta affects Delta outflow, which in turn affects the amount of ocean salinity that may advance up the estuary. The export rate can also affect the direction of flow in many Delta channels. In the drier times of most years, some Delta channels flow toward the CVP and SWP pumping plants rather than toward San Francisco Bay.

As regards control of ocean salinity, operation of the projects assures the Delta of less salinity intrusion than would occur without the projects, because the projects are operated to control salinity in the Delta and must do so to protect the quality of the export water. Releases from project reservoirs keep salinity in check during the dry season, but project operations reduce total Delta outflow over the full water year, allowing salinity to advance farther into the estuary at certain times than it would at those times under uncontrolled conditions.

Biological productivity in the estuary is highest in the zone where freshwater Delta outflows meet and mix with more saline waters of the bay. This "entrapment zone" concentrates sediments, nutrients, phytoplankton, striped bass larvae, and fish food organisms. It is considered advantageous that outflows be sufficient to keep the entrapment zone in the upper reaches of Suisun Bay, where it can spread out over a large area, rather than in the narrower Delta channels upstream from Suisun Bay.

Apart from salinity control, flows caused, provided, or controlled by the

CVP and SWP affect fish in numerous ways. Flow toward the project pumps draws both fish and fish food organisms into the export facilities. Larger fish are screened out, but smaller fish and fish food pass through and leave the Delta. Many of the larger fish do not survive screening and subsequent handling. The draw of the pumps may cause water to flow too fast for optimal fish food production in some channels, and the reverse (upstream) flows in some channels may confuse migrating fish. Downstream flows carry out-migrant anadromous fish to the ocean.

Factors besides CVP and SWP operations that affect fish dependent on the Delta-Bay ecosystem include water diversions within the Delta, diversions upstream, water pollution, agricultural return flows, fishing, and natural predator-prey interactions.

Striped Bass. Operation of the projects, and the resulting water qualities at various places in the Delta, affects abundance and distribution of striped bass in all phases of their life history. As described in Chapter 4 of the Final Environmental Impact Report on the Proposed Agreement to Manage Fish and Wildlife Resources of the Sacramento-San Joaquin Estuary, the number of adult striped bass in the estuary is partially determined by CVP and SWP exports from the southern Delta, salinity in certain Delta channels, outflows, and direction and velocity of flow through the Delta.

More than half the striped bass spawn in the Sacramento River, and an estimated 33 to 45 percent spawn in the San Joaquin River and adjacent sloughs between Antioch and the vicinity of Venice Island. The fish that spawn in the San Joaquin River prefer salinities below about 200 ppm TDS, but laboratory studies indicate that salinities up to 1,000 ppm do not affect egg survival. April is the month of highest concern.

Delta outflow is important for young striped bass and Neomysis shrimp, an important bass food source. Although information is lacking for a complete understanding of the factors controlling the young striped bass population, Delta outflow in the spring and early summer is believed significant. Maintenance of the entrapment zone in the Suisun Bay area (at outflows of about 4,000 to 6,000 cfs) is one beneficial function of outflow. At lower levels, the entrapment zone moves upstream into the less productive area around Antioch; and at extremely low levels, it moves into the western Delta.

Level and timing of exports from the southern Delta affect the number of striped bass eggs, larvae, and juveniles exposed to removal from the Delta with export water. Eggs and larvae, abundant from May through July, cannot be screened from export water; and the screening efficiency for small striped bass, abundant in July and August, is low at the present fish protective facilities. Higher exports at these times, therefore, impact striped bass to a higher degree than exports made in the fall and winter, when striped bass are less abundant in the southern Delta and can be screened fairly efficiently.

Flow patterns in the Delta affect the abundance of juvenile striped bass and their food supply. The most harmful project-induced flows are the reverse flows in the lower San Joaquin River, which draw young fish out of the western Delta toward the export pumps.

Decision 1485 protects striped bass spawning requirements with standards specifying the maximum salinity allowable in the lower San Joaquin River between Venice Island and Antioch from April 1 to May 5. From May 6 through the end of July, survival requirements of young striped bass are protected by standards specifying minimum allowable Delta outflow and limiting project export rates.

Salmon. Operation of the State Water Project and Central Valley Project in the Delta affects in-migrant (adult) and out-migrant (juvenile) chinook salmon on their way to and from spawning and nursery areas in the Sacramento and San Joaquin river systems. More than 90 percent of the Central Valley's chinook salmon are produced in the Sacramento River system. Flow direction and velocity in Delta channels, operation of the Delta Cross Channel, and exposure of fish to the export pumps are the major project-related factors affecting salmon survival.

Adult salmon require the presence of homestream water to guide them to their spawning grounds. Salmon using the San Joaquin River are seriously affected by SWP and CVP operation in this regard, since at many times virtually all San Joaquin River water is being exported.

Salmon from the Sacramento River system, migrating through the Delta as juveniles on their way to the ocean in the spring and early summer, are sometimes affected by reverse flows in the lower San Joaquin River. They are also affected by diversion into the interior Delta through the Delta Cross Channel, where survival is lower than if they continued downstream in the Sacramento River.

The exposure of chinook salmon to the SWP and CVP fish screens causes losses due to predation by larger fish in front of the screens, screen inefficiencies, and attrition in the process of handling and hauling screened fish.

Decision 1485 protects migrating salmon with year-round minimum flow requirements for the Sacramento River at Rio Vista.

Wildlife

The complex interface between land and water in the Delta-Bay estuary provides rich and varied habitat for wildlife,

especially birds. The Delta and Suisun Marsh are particularly important to waterfowl migrating via the Pacific Flyway.

In the Delta, the principal attraction for waterfowl is winter-flooded agricultural fields -- mainly cereal crops -- which provide food and extensive seasonal wetlands. The Delta, along with other principal wetlands that support Central Valley waterfowl, is winter habitat for 60 percent of the waterfowl on the Pacific Flyway, and for 91 percent of all waterfowl that winter in California. More than a million waterfowl are frequently in the Delta at one time /12/.

In Suisun Marsh, waterfowl use public and private wetlands managed for waterfowl habitat and recreational hunting. During the fall of dry years, the marsh has provided feeding and resting areas for up to 28 percent of California waterfowl, amounting to as many as one million birds /13/. Species of ducks wintering in the area include pintail, shoveler, mallard, widgeon, greenwinged teal, ruddy duck, canvasback, scaups, gadwall, bufflehead, and scoter. Geese, though much less common than ducks, are represented by Canada, snow, and white-fronted species.

Protection for growth requirements of the plants that provide food for ducks in the Suisun Marsh are included in Decision 1485 standards and are part of ongoing negotiations and protective facility development.

Small mammals also find suitable habitat in the Delta, Suisun Marsh, and upland areas. Vegetated levees, remnants of riparian forest, and undeveloped islands provide some of the best mammalian habitats in the region. Species include muskrat, mink, river otter, beaver, raccoon, gray fox, and skunks.

The area also supports a variety of non-game wildlife, including songbirds, hawks, owls, reptiles, and amphibians.

Rare and Endangered Species

Eight rare or endangered vertebrate species, including the southern bald eagle and the Aleutian Canada goose have been observed in the Delta, but none are confined exclusively to the Delta. Several rare invertebrates and many rare plant species also occur in the Delta; most are limited to freshwater marsh or vernal pool habitats. Project operations, by determining water quality distribution, affect some of the rare plants that depend on brackish water for survival.

Tables 6 and 7 list rare, endangered, and threatened species occurring in or near the Delta and in other areas where the Proposed Action could conceivably have some effect.

San Francisco Bay Complex

San Francisco Bay is the largest bay on the California Coast. The bay has a water surface area of about 420 square miles at mean high water, 274 miles of shoreline (not including islands), and about 130 square miles of adjacent tidal flats and marshes.

The surface hydrology of the bay can be divided into two distinct patterns. The northern bay, including San Pablo and Suisun bays, receives freshwater outflow from the Sacramento-San Joaquin Delta, and it functions as part of the Delta-Bay estuary. The southern bay receives scant runoff, and behaves like a lagoon. Circulation in and flushing of the Bay depends on tides and Delta outflow. Circulation is primarily a tidal process, while flushing is believed to depend on tidal action supplemented by periodic Delta outflow surges following winter storms.

San Francisco Bay supports marine fish and invertebrates and serves as a migration path for anadromous species. Popular sport fish include striped bass, surfperch, jacksmelt, and topsmelt.

Table 6

RARE, THREATENED, AND ENDANGERED ANIMALS IN OR NEAR THE
SACRAMENTO-SAN JOAQUIN DELTA AND THE DRAINAGE OF THE SACRAMENTO RIVER

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status*</u>	<u>Habitat and Distribution</u>	<u>COA Feature Near Occurrence of Species</u>
Lange's metalmark butterfly	<u>Apodemia mormo langei</u>	FE	Antioch sand dunes; Contra Costa County	San Joaquin River in the Delta
Valley elderberry longhorn beetle	<u>Desmocerus californicus dimorphus</u>	FT	Elderberry bushes near rivers; Sacramento and Solano Counties	Lower American River
California freshwater shrimp	<u>Syncaris pacifica</u>	SE, FC	Streams; Marin, Napa, and Sonoma Counties	Several miles from the Delta
Shasta salamander	<u>Hydromantes shastae</u>	SR, FC	Limestone fissures and caves near Shasta Lake; Shasta County	Shasta Lake
Giant garter snake	<u>Thamnophis couchi gigas</u>	SR	Freshwater marsh, riparian areas, rice fields, canals; Central Valley floor from Butte County to Fresno County	Sacramento River, Feather River, Delta
Aleutian Canada goose	<u>Branta canadensis leucopareia</u>	SE	Valley grassland, freshwater marsh, harvested fields, green barley and wheat fields; winters mainly in Sacramento and San Joaquin Valleys, minor use in Delta	Delta
Swainson's hawk	<u>Buteo swainsoni</u>	SR, FC	Grasslands, irrigated pastures, open fields; winters mainly in Central Valley and Klamath Basin	Sacramento, Feather, and American Rivers
Bald eagle	<u>Haliaeetus leucocephalus</u>	FE, SE	Lake margins and river courses; breeds in northern California; winters in most of State except for deserts	Shasta Lake, Whiskeytown Reservoir, Clair Engle, Folsom, and Oroville Lakes, and San Luis Reservoir
Peregrine falcon	<u>Falco peregrinus</u>	FE, SE	Breeds on cliffs in mountains and near coast; feeds and winters near coastal and inland marshes and riparian areas	Sacramento, Feather, and American Rivers, and Delta
California clapper rail	<u>Rallus longirostris obsoletus</u>	FE, SE	Salt marshes; Sonoma County to Santa Clara County	Delta, San Francisco Bay
Black rail	<u>Laterallus jamaicensis coturniculus</u>	SR, FC	Salt, brackish, and fresh marshes	Delta, San Francisco Bay
California yellow-billed cuckoo	<u>Coccyzus americanus occidentalis</u>	SR, FC	Riparian areas, orchards near streams; 7 rivers from Tehama County to Imperial County	Sacramento and Feather Rivers
Least Bell's vireo	<u>Vireo bellii pusillus</u>	SE, FC	Riparian areas; Santa Barbara to San Diego County	Formerly near Sacramento, Feather, and American Rivers
Saltmarsh yellowthroat	<u>Geothlypis trichas sinuosa</u>	FC	Fresh marshes for breeding, salt and brackish marshes in winter; breeds Sonoma County to San Mateo County	Delta, San Francisco Bay
Salt marsh harvest mouse	<u>Reithrodontomys raviventris</u>	FE, SE	Salt marshes; Sonoma County to San Mateo County	Delta, San Francisco Bay

* Status: FE = Federal Endangered
SR = State Rare

FT = Federal Threatened
SE = State Endangered

FC = Federal Candidate

Shellfish include mussels, oysters, clams, crabs, and shrimp.

Seasonal variations in salinities affect the seasonal distribution and survival of aquatic organisms. Benthic (bottom dwelling) invertebrates, such as clams, are limited to areas where conditions are favorable year-round.

Around the bay, three habitat types are found: open water, tidal mudflats, and marshland. Such habitats are used by various species, but mainly shorebirds and waterfowl.

The bay has been impacted by many factors, including pollution, land reclamation, ship channels, and sediment

Table 7

RARE AND ENDANGERED PLANTS IN OR NEAR THE SACRAMENTO-SAN JOAQUIN DELTA AND THE DRAINAGE OF THE SACRAMENTO RIVER

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status*</u>	<u>Habitat and Distribution</u>	<u>COA Feature Near Occurrence of Species</u>
Contra Costa wallflower	<u>Erysimum capitatum</u> var. <u>angustatus</u>	FE, SE	Loose sand; Antioch Dunes, Contra Costa County	Delta
Antioch Dunes evening primrose	<u>Oenothera deltoidea</u> <u>howellii</u>	FE, SE	Loose sand; Antioch Dunes, Contra Costa County	Delta
Suisun aster	<u>Aster chilensis</u> var. <u>lentus</u>	FC	Coastal salt marshes; Suisun Bay, Solano County	Delta
California hibiscus	<u>Hibiscus californicus</u>	FC	Freshwater marshes; Contra Costa County and San Joaquin County	Delta
Delta tule-pea	<u>Lathyrus jepsonii</u> ssp. <u>jepsonii</u>	FC	Freshwater marshes; Suisun and San Pablo Bays	Delta
Mason's lilaepsis	<u>Lilaeopsis masonii</u>	SR, FC	Mudflats; Delta	Delta
Valley sagittaria	<u>Sagittaria sanfordii</u>	FC	Sloughs and sluggish streams, freshwater marsh; Central Valley	Sacramento River, Delta
Slender orcutt grass	<u>Orcuttia tenuis</u>	SE	Vernal pools in valley grassland and foothill woodland; Shasta, Tehama, and Lake Counties	Sacramento River
Greene's orcutt grass	<u>Orcuttia greenei</u>	SR	Moist open places in valley grassland; Tehama to Tulare Counties	Sacramento River
Hairy orcutt grass	<u>Orcuttia pilosa</u>	SE	Vernal pools in valley grassland; Stanislaus to Madera Counties	Sacramento River
Sticky orcutt grass	<u>Orcuttia viscida</u>	SE	Valley grassland; Sacramento County	American River
Colusa grass	<u>Neostapfia colusana</u>	SE	Vernal pools in valley grassland; Colusa, Stanislaus, and Merced Counties	Sacramento River

* Status: FE = Federal Endangered
SR = State Rare
FC = Federal Candidate
SE = State Endangered

load from early gold mining activity. The potential effect on the bay of the CVP and SWP, as well as other projects such as Hetch Hetchy and Mokelumne River Aqueduct and overall availability of freshwater inflow, is being studied, but results are several years away.

Environmental Consequences, Delta-Bay Estuary

This section compares the environmental conditions expected in the Delta-Bay estuary with the Proposed Action to corresponding conditions expected with No Action, Case A. Case A is the No Action scenario in which both the Central Valley Project and the State Water Project are operated to meet only the Tracy standards for Delta water quality in critical years. With the Proposed Action, both projects would be operated for the Exhibit A standards of the Coordinated Operation Agreement in all years, including critical years. With the Proposed Action and with all No Action cases A, both projects would be operated to meet the Exhibit A standards in years other than critical.

No Action Cases B and C are not specifically evaluated, but their consequences can be estimated by reference to the consequences of the Proposed Action and No Action, Case A. No Action, Case B, is the scenario in which the CVP is operated for the Tracy standards in critical years, while the SWP operates as if the Exhibit A standards are in effect; i.e., releases its share of the additional water needed to meet Exhibit A standards. Environmental consequences of No Action, Case B, in the Delta-Bay estuary would be intermediate between those of Proposed Action and No Action, Case A, but Case B conditions are not quantified or specifically described except in Table 4, Chapter 3. No Action, Case C, is the scenario in which the CVP is operated for the Tracy standards in critical years while the SWP provides all additional water needed to meet Exhibit A. The environmental

consequences of No Action, Case C, in the Delta-Bay estuary, would be similar to those of the Proposed Action.

Delta Agriculture

Operation of the CVP and SWP affects water qualities for agriculture differently in different parts of the Delta. The parts of the Delta that have good hydraulic connections to the Delta Cross Channel, through which project water runs directly from the Sacramento River, benefit most. The other parts of the Delta are less advantageously situated.

Proposed Action. Implementing the Proposed Action would have no adverse effects on Delta agriculture, as compared to No Action, Case A.

Water quality conditions for agriculture in critical years would be better with the Proposed Action.

No Action. Operation study results for critical years indicate that water quality conditions in No Action, Case A, would be significantly worse for Delta agriculture than conditions in the Proposed Action. Small adverse differences having potential to affect salt-sensitive crops were observable at most stations throughout the Delta in results from DWR's PCSTAGE and EIRSALT computer models. The major difference, however, was observable at the station representing Emmaton, which is on the north side of Sherman Island near the mouth of the Sacramento River. Salinity at Emmaton is indicative of salinity in the western Delta.

Monthly average salinities at Emmaton during the irrigation season, in millimhos per centimeter EC (electrical conductivity), for the six critical years modeled at the 1980 level of development, with the Tracy standards controlling in No Action, Case A, and the Exhibit A standards controlling in the Proposed Action, are as follows (values at higher-high tide):

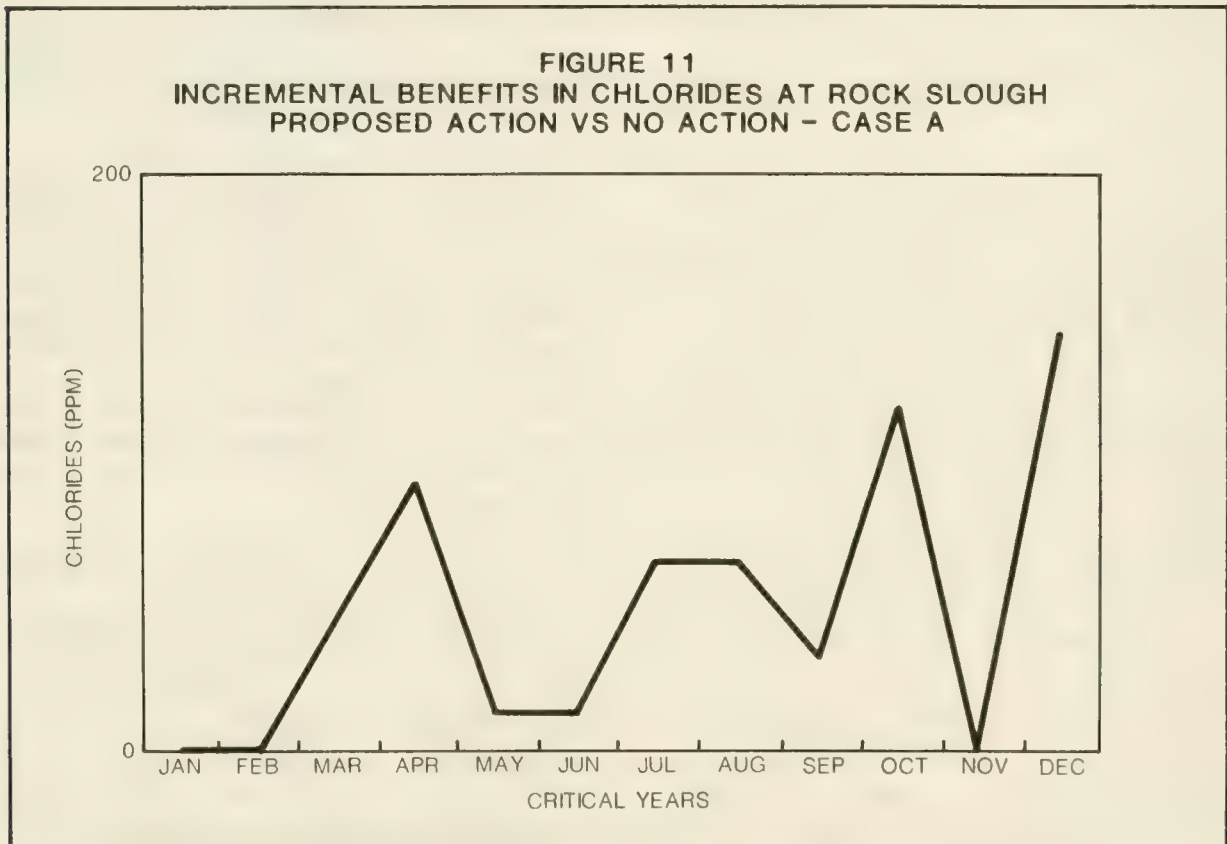
	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>
Proposed Action	0.9	0.9	1.2	1.6	1.9	2.4
No Action, Case A	1.9	1.9	1.8	2.3	2.8	3.2

Municipal and Industrial Use

The following analysis is based on the State Water Resources Control Board's Final Environmental Impact Report for Decision 1485 and on the operation studies described in Chapter 3.

In either case, salinities would be high enough to impair full yields of crops normally grown in the area, such as corn, but growers would face much more severe salinity problems in No Action, Case A. High salinity early in the irrigation season, when plants are germinating, would be particularly damaging. A significant reduction in crop yields during critical years should be expected in No Action, Case A. In the Proposed Action, full or nearly full yields of corn or asparagus could be obtained in critical years with careful management and adequate leaching.

Proposed Action. Implementing the Proposed Action would have no adverse effects on local municipal and industrial users of Delta waters, compared to No Action, Case A. Operation study results (Figure 11) indicate that with the Exhibit A standards controlling in the Delta, salinity of the water available at Rock Slough for diversion into the Contra Costa Canal would stay within the quality range acceptable for municipal and industrial use (150 ppm chloride or less). The values plotted on Figure 11 are from monthly salinity values projected through the six



historical critical years modeled at the 1980 development level.

No Action. Replacing the Proposed Action's Exhibit A standards with the Bureau's Tracy standards as the controlling criteria for Delta water quality in critical years would adversely affect local municipal and industrial users of Delta waters.

Direct diversion would be affected little, if at all, because salinity of the water offshore from Contra Costa County in critical years would be above the maximum levels acceptable for direct diversion virtually all the time, regardless of which criteria controlled. Thus, the effect on the quality of substitute supplies from the Contra Costa Canal is more significant.

Under the Exhibit A criteria of the Proposed Action, chloride at the Rock Slough intake of the Contra Costa Canal is required to be 150 ppm or less for at least 155 days each year and may not exceed 250 ppm at any time. State-wide project operation study results indicate that these requirements would be more than met in a critical year. With the Tracy criteria replacing Exhibit A, operation studies indicate that the Exhibit A criterion of 150 ppm chloride for 155 days would be met in critical years, but the 250 ppm maximum chloride limit would occasionally be exceeded. EPA's recommended maximum of 500 ppm TDS would also be exceeded occasionally with the Tracy criteria controlling. Chloride and TDS concentrations exceeding the recommended maxima may be objectionable, but are not in themselves considered hazardous to health.

High chloride concentrations at the Rock Slough intake may be indicative of sea water intrusion, and sea water contains bromides that promote the formation of trihalomethanes when water is chlorinated for municipal use. Trihalomethanes are suspected carcinogens (cancer-causing agents).

The EPA standard for the maximum concentration of trihalomethanes in drinking water is 100 parts per billion. Contra Costa Water District has found that when its raw water supplies, such as from the Contra Costa Canal, contain chloride in excess of 100 parts per million, the water after chlorination will contain trihalomethanes at levels above the EPA standard. To control trihalomethane formation, the district has implemented an ammonia treatment process. This inexpensive process has been found effective in keeping trihalomethane concentrations to below the EPA standard.

With the Tracy standards controlling in critical years, chlorides in Contra Costa Canal water would frequently exceed 150 ppm. During the 1976-77 drought, such chloride levels required modifications in the process used to produce salt-sensitive papers and cardboard at the Crown Zellerbach and Louisiana Pacific (then Fibreboard) plants near Antioch. These modifications increase production costs and limit production capacity.

Fish

Information in this section concerning the Delta and Suisun Marsh is based largely on material provided by the California Department of Fish and Game. Information concerning rivers and upstream reservoirs was provided by the U. S. Fish and Wildlife Service.

Operation of the Central Valley Project and State Water Project is believed to be one of many factors affecting fish in the Delta-Bay estuary. The Proposed Action would provide important protection for fish that would be sacrificed in the driest years (critical years) with No Action, Case A.

Proposed Action. For striped bass, the Proposed Action would be expected to have the following consequences:

- ° Salinity in the Lower San Joaquin River. Operation studies using the hydrology of the 1928-1934 critical period indicate salinities in the San Joaquin River at San Andreas Shoals (within the spawning area) ranging from 75 to 192 ppm TDS. These salinities are well within the range considered suitable for striped bass spawning.
- ° Delta Outflow. Exhibit A standards of the proposed Coordinated Operation Agreement give an assurance of ample outflow to maintain an entrapment zone favorable to the growth and survival of young striped bass. Summer flows during critical years are in the range of 3,500 to 4,500 cfs, and flows earlier in the year are higher.
- ° CVP and SWP Exports. The export limitations imposed by Exhibit A in May, June, and July reduce diversion of striped bass eggs and larvae (compared to unrestricted pumping). Losses at the export pumps are still high, however, especially in drier years when flows are low and a higher percentage of Delta inflow is diverted.

For salmon, the Proposed Action would be expected to have the following consequences:

- ° Flow in Delta Channels. The Proposed Action would provide minimum flow standards at Rio Vista and provide for control standards at the Delta Cross Channel to minimize cross-Delta movement of salmon.
- ° CVP and SWP Exports. May and June export limitations that would be observed by the projects under the Proposed Action would decrease the exposure of salmon to the export pumps, as compared to unlimited pumping during those months. However, substantial losses would still occur.

For San Francisco Bay, the Proposed Action, as compared to No Action, Case A, could have the effect of

slightly lessening peak Delta outflows in the year or years immediately following critical years. However, Delta outflows during most years, including critical years, would be higher with the Proposed Action, and this would be beneficial to fish and wildlife of the estuary overall.

Due to the outflow standards and export limitations described above, the Proposed Action would help to assure maintenance of existing standards designed to protect fish and fish habitat in the Delta.

No Action. For striped bass, No Action, Case A, would be expected to have the following consequences:

- ° Salinity in the Lower San Joaquin River. Operation studies using the hydrology of the 1928-1934 critical period indicate salinities in the San Joaquin River at San Andreas Shoals (within the spawning area) as high as 279 ppm TDS in April, exceeding the level at which striped bass prefer to spawn.
- ° Delta Outflow. With the Tracy standards controlling in critical years, outflows would be 3,000 to 3,500 cfs in July, August, and September. These outflows are inadequate to maintain the entrapment zone in the Suisun Bay area, and decreases in Neomysis and young striped bass abundance would be expected.
- ° CVP and SWP Exports. Operating the CVP and SWP to Tracy standards in critical years and to the provisions of Exhibit A in all other years would not change exports during the period when striped bass eggs and larvae are abundant. Therefore, there would be no difference in impacts associated with No Action, Case A.
- ° Flow in Delta Channels. Operation studies indicate that operating the CVP and SWP to meet the Tracy standards in critical years rather than the

standards of Exhibit A would increase the magnitude of reverse flows in the lower San Joaquin River. With Tracy standards, critical year reverse flows in the lower San Joaquin average 2,100 cfs. Such reverse flows would exacerbate an already detrimental condition.

For salmon, No Action, Case A, would be expected to have the following consequences:

- ° Flow in Delta Channels. Operating the CVP and SWP to the Tracy standards in critical years would increase the frequency and magnitude of reverse flows in the lower San Joaquin River in April, causing an increase in the number of juvenile salmon from the Sacramento River that would be drawn to the export pumps. Also, flows in the Sacramento River would decrease in April, May, and June compared to operation for the Exhibit A standards, further reducing the survival of juvenile salmon migrating down the river.
- ° CVP and SWP Exports. Operation studies at the 1980 and 2020 levels of development indicate virtually no change in exports during critical years when operating to the Tracy standards, as compared to exports in those same years when operating to the Exhibit A standards. Therefore, no adverse impact would be expected from operating to the Tracy standards. However, if the relaxation to Tracy standards were used to increase exports rather than to retain reservoir storage, all the adverse effects associated with exporting water from the Delta and transferring water across the Delta would be exacerbated.

Abundance and distribution of resident fish in the Delta would not be expected to be significantly affected by substituting the Tracy standards for those of Exhibit A in critical years.

In general, critical year operation of the CVP and SWP would be more harmful to Delta fish under No Action, Case A, than it would be under the Proposed Action.

Wildlife

CVP and SWP operations have little observable effect on wildlife of the Delta-Bay estuary, except in Suisun Marsh. Protective measures, including facilities and agreements, are part of planning, and the Agreement specifies a methodology for incorporating Suisun Marsh protective features when negotiations are completed. Accordingly, the analysis of environmental differences between the Proposed Action with planned marsh facilities and No Action Case A focuses on differences that would be observed in Suisun Marsh, much of which is managed specifically for waterfowl. These differences would exist in critical years, assuming that the CVP and SWP would be operated to meet the Exhibit A standards under the Proposed Action and to meet the Tracy standards under No Action, Case A.

The seeds of the alkali bulrush plant constitute the bulk of the winter food supply for waterfowl using Suisun Marsh. Therefore, production of this food directly relates to the marsh's waterfowl holding capacity. Production of alkali bulrush seeds is related to the salinity of the water in the Marsh, which is determined in part by project operations. Salinity during May has the best correlation to alkali bulrush seed production.

A computer model of the marsh channels was employed to compare applied water salinities and resulting alkali bulrush seed production under No Action, Case A, and the Proposed Action combined with future marsh facilities for a critical year. Results of this comparison showed significant acreage increases with improved applied water salinities below 11.0 EC. These studies are on file with the Department of Water Resources.

Relationships supplied by the Department of Fish and Game between applied water salinity categories and average production and germination of alkali bulrush seeds in Suisun Marsh shown in Table 8.

Table 8

**SALINITY RELATIONSHIP TO
ALKALI BULRUSH SEED PRODUCTION
AND GERMINATION**

<u>Electrical Conductivity</u>	<u>Percent of Maximum Seed Production</u>	<u>Percent Germination</u>
To 11.1	90	60
11.1 to 14.0	60	44
14.1 and Up	23	16

Applying the relationships in Table 8, conditions existing under the Proposed Action would maintain high alkali bulrush seed production and germination throughout larger areas of the marsh than would the modeled conditions under No Action, Case A. Therefore, the waterfowl holding capacity of the marsh would be greater under the Proposed Action.

**Rare, Threatened, and
Endangered Species**

Neither the Proposed Action nor No Action, Case A, would significantly affect rare, threatened, or endangered species in the Delta-Bay estuary.

Proposed Action. The Proposed Action would not affect rare, threatened, or endangered species in the Delta or Suisun Marsh. The marsh habitats of the California clapper rail, salt marsh harvest mouse, California black rail, and salt marsh yellowthroat are influenced by Delta outflow, which determines the level of salinity in the Delta-Bay marshes.

At both the 1980 and 2020 levels, Delta outflows would be higher during critically dry years with the Proposed Action

than with No Action, Case A. The additional outflow would cause less saline conditions in the estuary, favoring brackish marsh habitats over salt marsh habitats. Brackish marshes are preferred by yellowthroat; salt marshes are preferred by the harvest mouse and black rails. Clapper rail inhabit both brackish and freshwater marshes. Critically dry years are infrequent, however, so there would be no appreciable difference in estuary marsh habitats between the Proposed Action and No Action, Case A, except temporary differences in the salinity of marsh waters and soils.

Delta outflows with and without the Proposed Action are similar enough that there would be no effects on marshes in the San Francisco Bay area. Therefore, the Proposed Action would not affect California clapper rail, California black rail, salt marsh yellowthroat, and salt marsh harvest mouse in the bay area.

The Proposed Action would not affect the California freshwater shrimp, since this species inhabits freshwater streams outside the Delta-Bay area.

The Proposed Action would not affect the Aleutian Canada goose. Marsh vegetation at Grizzly Island and other areas occasionally used in the winter by this species would not be affected. During critically dry years, the Exhibit A standards would maintain higher quality water for Delta agriculture than would the Tracy standards of No Action, Case A. Crop yield would not be reduced, and Aleutian Canada geese would still be able to feed in the Delta.

The Proposed Action would not increase areas of the Antioch dunes flooded by the San Joaquin River, and therefore would not affect the Lange's metalmark butterfly, Antioch dunes evening primrose, Contra Costa wallflower, and Suisun aster. Higher water quality associated with the Proposed Action, as compared to No Action, Case A, would be favorable for other Delta plant species.

However, a Delta outflow difference resulting in higher water quality would only occur in critically dry years.

No Action. In No Action, Case A, at both the 1980 and 2020 levels, Delta outflow in critically dry years would be lower than it would be under the Proposed Action. Slightly higher salinities would result, temporarily making marshes more saline. The higher salinity would temporarily benefit harvest mice, black rails, and some clapper rails. No Action, Case A, would not affect the above species in San Francisco Bay, because bay hydraulics would not be significantly different, as compared to the Proposed Action.

Aleutian Canada geese that use Grizzly Island and other Delta areas would not be affected, because marsh vegetation would not be changed.

Affected Environment
State Water Project Service Areas

The State Water Project has water supply contracts with 30 public agencies whose jurisdictions encompass a fourth of the land area of California and two-thirds of the population. The areas receiving State Water Project water include most of Southern California, the southern part of the San Joaquin Valley, the San Francisco Bay area, and areas in the Feather River region of Northern California, from which State Water Project water originates. Figure 12 shows the State Water Project contracting agencies and service areas.*

Most of the State Water Project water delivered in Southern California and the San Francisco Bay area is for urban use, while most delivered in the San Joaquin Valley is for agricultural use. Contracts for delivery of water in the Feather River region represent only

about 1 percent of the total under contract. The table accompanying Figure 12 identifies the State Water Project contracting agencies and shows the amounts of water for which they have contracted.

Agricultural Uses

The agricultural areas served by the State Water Project are mainly in Kings and Kern counties, and mainly in the western portions of these counties. The one exception is the Oak Flat Water District in western Stanislaus County. These areas relied on the State Water Project for 71 percent of their irrigation water supply in 1981, when the estimated value of crops grown with SWP water was \$474 million. Cotton accounted for 41 percent of this total; almonds, oranges, pistachios, grapes, cantaloupes, lettuce, onions, alfalfa seed and hay, and wheat together accounted for another 41 percent, and about 40 other crops accounted for the remainder /14/.

The estimated values of SWP water to agricultural water users in future years (1983 dollars) are:

<u>Year</u>	<u>Dollars per Acre-Foot</u>
1985	168
1990	204
1995	224
2000	242
2010	264
2020	270
2035	276

These values were determined using the Department of Water Resources Central Valley Agricultural Model, based on the increment in net farm income producible with increments in SWP agricultural supply.

*Central Coastal area contractors of the SWP would be served by a Coastal Branch of the California Aqueduct that has yet to be built. Construction has been postponed indefinitely, because neither of the two contractors has set a date for initial delivery of SWP water.

Urban Uses

The urban areas served by the State Water Project include the most heavily populated parts of the most populous state in the United States, a state whose economy would rank seventh among nations of the world. The State Water Project is a major water supplier for the State's south coastal area, in which a little over half of all Californians live. In 1975 this area relied on the State Water Project for 15 percent of its water requirement of 3.4 million acre-feet. By the year 2000, this fast-growing area is expected to require more than 4 million acre-feet of total water supply, with the State Water Project expected to supply about a third /15/. In the San Francisco Bay area, the State's other major population center, the State Water Project supplies a lesser but still crucial portion of the area's total.

The estimated values of SWP water to the project's urban water users in future years (1983 dollars) are:

<u>Year</u>	<u>Dollars per Acre-Foot</u>
1985	107
1990	368
1995	377
2000	480
2010	630
2020	630
2035	630

These estimates are based on the costs of meeting projected SWP urban water demands through extraordinary conservation measures and local supply alternatives.

Environmental Consequences, State Water Project Service Areas

For the State Water Project service areas, the scenario of concern is that represented by No Action, Case C; in which the Central Valley Project would

be operated to meet the Tracy standards and the State Water Project would provide all the additional water necessary to meet the standards of Exhibit A or Decision 1485. Making up the CVP share of the difference in Delta outflow requirements between the two sets of standards would cost the SWP the equivalent of 143,000 acre-feet of firm annual yield. No Action Cases A and B would not affect the yield of the SWP, but adverse water quality impacts would be associated with each. With the Proposed Action, neither the yield nor water quality of the SWP would be adversely affected.

Proposed Action

The Proposed Action of executing the draft Coordinated Operation Agreement would have no adverse effects in the SWP service areas.

The main effect of the Proposed Action as far as the SWP service areas are concerned would be to give better assurance of the full deliverable yield of the project in critical years, without the substantial yield reduction that might be incurred if the CVP were not operated to meet the Exhibit A standards (as in No Action, Case C). Another possible effect is that with the Proposed Action, the Department may be able to arrange, with successful public negotiations and further environmental documentation, to buy water from the CVP to augment SWP yield (see "Related Actions and Projects" section of this chapter). Such a yield augmentation could help to alleviate expected water shortages.

No Action

The three cases of the No Action alternative will be discussed individually.

Case A. This is the No Action scenario in which both the SWP and CVP are operated to meet the Tracy standards in

Figure 12: SWP SERVICE AREAS AND CONTRACTING AGENCIES



Location No.	Contracting Agency	Maximum Annual Entitlement acre-feet, ⁽²⁾
	(1)	(3)
UPPER FEATHER AREA		
1	City of Yuba City	9,600
2	County of Butte	27,500
3	Plumas County Flood Control and Water Conservation District	2,700
	Subtotal	39,800
NORTH BAY AREA		
4	Napa County Flood Control and Water Conservation District	25,300
5	Solano County Flood Control and Water Conservation District	42,000
	Subtotal	67,000
SOUTH BAY AREA		
6	Alameda County Flood Control and Water Conservation Dist., Zone 7	46,000
7	Alameda County Water District	42,000
8	Santa Clara Valley Water District	100,000
	Subtotal	188,000
SAN JOAQUIN VALLEY AREA		
9	County of Kings	4,600
10	Devil's Den Water District	12,700
11	Ludley Ridge Water District	57,700
12	Empire West Side Irrigation District	3,000
13	Kern County Water Agency	1,154,000
14	Oak Flat Water District	5,700
15	Tulare Lake Basin Water Storage District ⁽⁴⁾	22,500
	Subtotal	1,355,000
CENTRAL COASTAL AREA		
16	San Luis Obispo County Flood Control and Water Conservation District	25,000
17	Santa Barbara County Flood Control and Water Conservation District	57,700
	Subtotal	82,700
SOUTHERN CALIFORNIA AREA		
18	Antelope Valley-East Kern Water Agency	138,400
19	Castaic Lake Water Agency	41,500
20	Coachella Valley Water District	23,100
21	Crestline-Lake Arrowhead Water Agency	5,800
22	Desert Water Agency	38,100
23	Littlerock Creek Irrigation District	2,300
24	Mojave Water Agency	50,800
25	Palmdale Water District	17,300
26	San Bernardino Valley Municipal Water District	102,600
27	San Gabriel Valley Municipal Water District	28,900
28	San Geronimo Pass Water Agency	17,300
29	The Metropolitan Water District of Southern California	2,011,500
30	Ventura County Flood Control District	20,000
	Subtotal	2,497,500
TOTAL STATE WATER PROJECT		4,230,000

critical years and the Exhibit A standards in all other years. With the Tracy standards controlling Delta water quality, quality of the SWP export water taken at Clifton Court Forebay would be poorer than it would be with the Exhibit A standards controlling (see Figures 13 and 14). Even so, quality would still be sufficient to meet all applicable standards for drinking and irrigation water, so no attempt was made to quantify impacts. Irrigators might have to do some additional leaching of salts during the non-irrigation period.

Case B. This is the No Action scenario in which the CVP is operated to meet the Tracy standards and the SWP releases the same amount of water for the Delta that it would with the Proposed Action. Yield of the SWP would be unaffected as compared to the Proposed Action, and SWP export water quality would be intermediate between that expected with the Proposed Action and that expected with No Action, Case A.

Case C. The amount of additional water the SWP would have to provide for the Delta to meet Exhibit A or Decision 1485 without help from the CVP would vary according to the hydrology of the particular critical year. Since the operators of the SWP could not know in advance which years would be critical, they would have to operate the SWP in every year in a manner that takes into account the possibility that a critical year is imminent and the CVP will switch to Tracy standards. Therefore, the SWP operators would hold back deliveries and keep a higher reserve in storage against the possibility of a critical year. Keeping this additional reserve would cost SWP water users 143,000 acre-feet of their firm annual water supply. Using the water supply values given earlier and prorating them according to the proportions of agricultural and urban users of SWP water, 143,000 acre-feet of SWP firm annual supply from 1985 through 2035 has an annual present value (at 8.125 percent) of about \$28,000,000 (1983 dollars). This value represents

the annual potential loss to SWP water users should the scenario of No Action, Case C, be realized.

Affected Environment, Central Valley Project Service Areas

At present, the Bureau of Reclamation has contracted to deliver 7.32 million acre-feet of Central Valley Project water, including the sale of an additional 250,000 acre-feet of interim water to the Westlands Water District. Table 9 lists present CVP contractors (except those of the Friant Division, operated independent of other CVP facilities) and their maximum contractual entitlements. CVP facilities and service areas are shown in Figure 15.

CVP water supply contracts contain buildup provisions identifying periods during which the contractors may use less than their full entitlements. Present deliveries (1980) total about 6.25 million acre-feet to long-term contractors. The Bureau estimates that nearly all CVP yield will be under contract and fully utilized by the year 2020.

Agricultural Uses

The CVP serves agricultural users throughout the Sacramento and San Joaquin valleys, the two largest of California's six major agricultural areas.

After meeting a demand of about 2.5 million acre-feet for water rights and other authorized purposes, the CVP delivered about 3.4 million acre-feet of irrigation water to farms in 1978. This provided a full or partial irrigation supply to about 2.1 million acres that produced crops valued at about \$1,644 million. If all project water had been used to provide a full supply (rather than a combination of full and supplemental service), about 1.3 million acres could have been irrigated.

FIGURE 13
INCREMENTAL BENEFITS IN TDS AT CLIFTON COURT
PROPOSED ACTION VS NO ACTION - CASE A

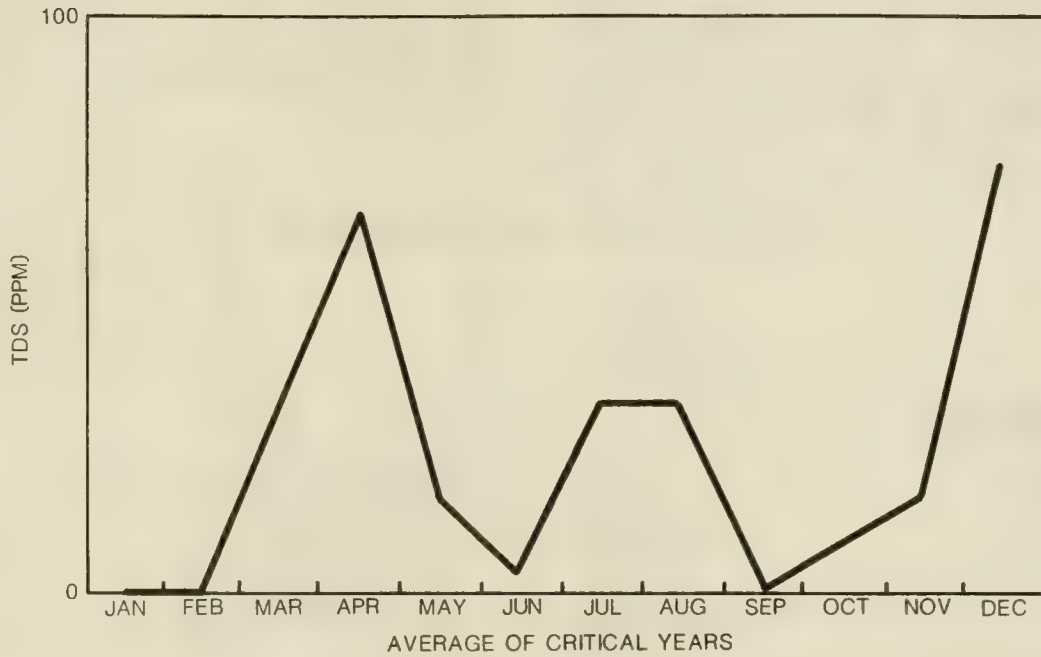
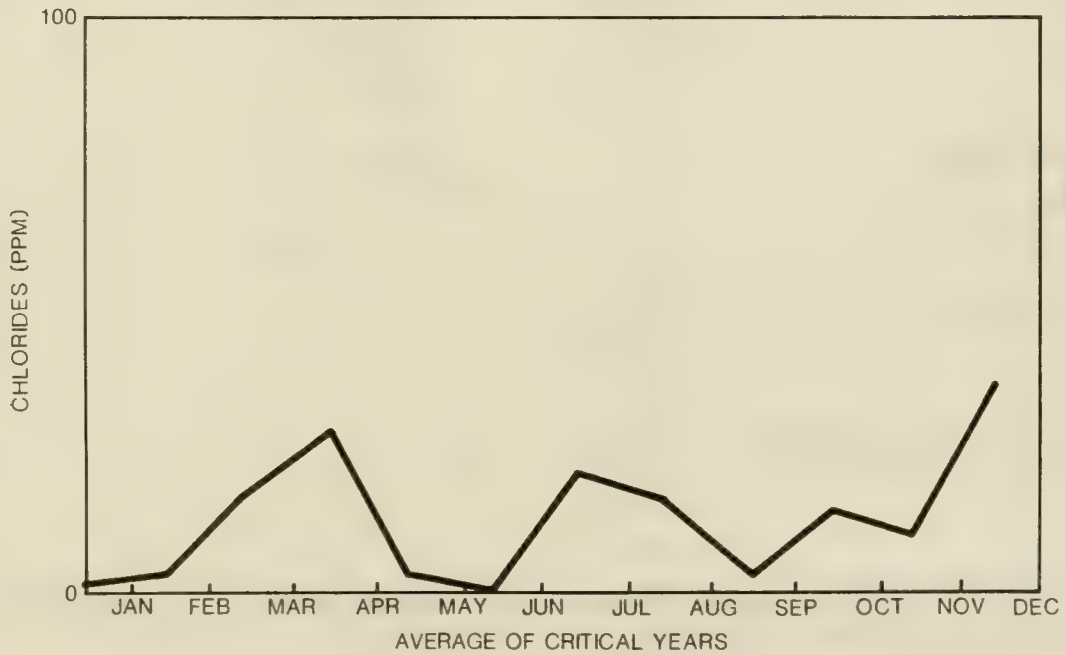


FIGURE 14
INCREMENTAL BENEFITS IN CHLORIDES AT CLIFTON COURT
PROPOSED ACTION VS NO ACTION - CASE A



Urban Uses

About 152,000 acre-feet of CVP water was furnished to communities for municipal and industrial use in 1978. The largest share of the water was delivered through the Contra Costa Canal to the cities of Martinez, Antioch, and Pittsburg and to a large industrial complex composed of

steel, oil, rubber, paper, and chemical plants. The cities of Redding, Roseville, Placerville, Sacramento, Fresno, and Coalinga also receive all or a portion of their water from the CVP. East Bay Municipal Utility District and Sacramento Municipal Utility District have entered into long-term contracts for CVP water.

Table 9

CENTRAL VALLEY PROJECT LONG-TERM OBLIGATIONS*

	<u>Maximum Entitlement (acre-feet)</u>		<u>Maximum Entitlement (acre-feet)</u>
<u>SACRAMENTO VALLEY</u>		<u>DELTA</u>	
Clear Creek South	15,300	Delta-Mendota Canal:	
Cow Creek South	24,000	DMC Marketing Program	537,092
City of Redding	6,140	Exchange Contracts	840,000
Feather Water District	20,000	Schedule II	37,277
Spring Creek Conduit and Others	1,500	Grasslands	50,000
Toyon Pipeline	3,960	State of California	19,000
Shasta Area	5,000	Losses	120,000
Sacramento River Diverters:		Contra Costa Canal:	
Project Water	374,335	Schedule A	86,000
Base Supply	1,818,416	Schedule B	39,000
Bypasses and Riparian	500,000	Schedule C	70,000
Sacramento Canals:		San Luis Canal:	
Corning Canal	43,800	San Luis Irrigation**	979,200
Tehama-Colusa Canal	286,200	San Luis Interim	7,000
Stony Creek	170	Miscellaneous	5,700
Losses	<u>12,000</u>	Municipal and Industrial	16,500
Subtotal	3,110,821	Losses	59,000
		San Felipe Unit	196,300
		Cross Valley Canal	<u>125,832</u>
<u>AMERICAN RIVER</u>		Subtotal	3,187,901
El Dorado County	6,166	TOTAL	7,132,922
El Dorado County Water Rights	103,834		
San Juan Suburban	11,200		
City of Roseville	32,000		
North Fork, Natomas Ditch, Folsom Prison	69,000		
Placer County	117,000		
City of Sacramento	230,000		
Folsom South Canal:			
Sacramento Municipal Utility District	75,000		
East Bay Municipal Utility District	150,000		
Losses	<u>40,000</u>		
Subtotal	834,200		

* Pages C-77 and C-78, Draft Environmental Statement on the Reauthorization of the CVP and the Coordinated Operation Agreement for CVP-SWP.

** Westlands Water District = 900,000 acre-feet.

**Figure 15: THE CVP
AND ITS SERVICE AREAS**
(Service Areas Shaded)



Economic and Social Conditions

The development and growth of the CVP has stimulated economic and social growth throughout California's Central Valley -- especially in the San Joaquin Valley. Communities have developed in some of the new farming areas, and the activities within these communities are dominated by farming operations. Several San Joaquin Valley counties are among the top counties in the nation in value of farm products, due to farming operations made possible by CVP and other water supplies.

Californians spend millions of "recreation days" each year enjoying the boating, fishing, swimming, picnicking, and other outdoor recreation opportunities afforded by CVP facilities.

Environmental Consequences, Central Valley Project Service Areas

For CVP water users, the choice between the Proposed Action of executing the draft Coordinated Operation Agreement and No Action is between committing the water necessary to meet the CVP share of Exhibit A requirements or leaving the same water uncommitted and possibly available for some other use.

Under the assumptions contained in the operation studies supporting the draft Agreement, the Bureau of Reclamation would be able to meet all of its present contractual commitments of about 7.3 million acre-feet of water, market an additional 900,000 acre-feet, and meet its share of Exhibit A along with the SWP.

Theoretically, there are two conditions when CVP water users could expect to take larger than normal deficiencies as a result of the Proposed Action: during critically dry years, and at the ultimate level of CVP development. However, if in the No Action cases the water needed to meet the CVP share of the Exhibit A requirements were reserved

to supply new contractors, the consequences for the existing CVP contractors would be the same as with the Proposed Action.

Affected Environment, Rivers and Reservoirs

This section describes the resources potentially affected by the Proposed Action and the No Action alternative in and on the river systems controlled by the CVP and SWP. The CVP controls the Trinity, Sacramento, and American rivers; the SWP controls the Feather and (with the CVP) the Sacramento below its confluence with the Feather.

Sacramento River

California's largest river, the Sacramento, drains the northern half of the Central Valley basin, including the Sacramento Valley. The headwaters are in the Cascade Mountains, although a major tributary, the Pit River, originates in the Goose Lake basin on the California-Oregon border. The drainage area of the Sacramento River above Shasta Dam encompasses 6,649 square miles, producing a mean unimpaired annual flow of 5.7 million acre-feet (1894-95 through 1946-47). The portion of the Sacramento most susceptible to being affected by the Proposed Action or its alternative is the reach from Shasta Dam to Red Bluff Diversion Dam, but effects are possible along the full length of the river from Shasta Dam through the Sacramento-San Joaquin Delta.

Project Facilities. Shasta Dam, on the Sacramento River, 9 miles northwest of Redding, is the key facility of the CVP. It impounds Shasta Lake, with a maximum capacity of 4.5 million acre-feet. The lake is popular for boating, fishing, swimming, water-skiing, camping, hunting, and houseboating. Recreation use is about 2 million visitor days annually. The fishery is moderately

productive for both warmwater and coldwater species.

Keswick Dam, 9 miles downstream from Shasta Dam, forms Keswick Reservoir as an afterbay for Shasta Dam. Keswick has fish trapping facilities that operate in conjunction with the Coleman Fish Hatchery, 25 miles downstream on Battle Creek. Salmon and other fish are trapped as they reach the dam, and are then taken to the hatchery, operated by the U. S. Fish and Wildlife Service.

About 50 miles downstream from Keswick Dam, the CVP operates Red Bluff Diversion Dam to channel Sacramento River water into the Corning and Tehama-Colusa canals. Together, the canals can divert as much as 3,030 cfs to agricultural areas on the west side of the Sacramento Valley. The first reach of the Tehama-Colusa Canal has the additional function of providing 1.6 million square feet of gravel bottom for salmon spawning. This is the world's largest spawning facility.

Seepage. Seepage through the levees and onto adjacent farmlands can become a problem along the middle and lower reaches of the Sacramento River during high flow periods. In some instances, seepage damage to orchard and field crops has been estimated in the millions of dollars.

The critical stages that will cause seepage vary along the river and are not precisely known. For this report, it was assumed that a potential for seepage problems exists when flows below Red Bluff Diversion Dam exceed 1 million acre-feet per month, which is consistent with observed occurrences of seepage.

Water Quality. Two water quality problems affecting the Sacramento River are high water temperatures and heavy metal toxicity. Warm water temperatures in the upper reaches of the river sometimes adversely affect upstream salmon migration and spawning. This problem is

most severe in the early fall of dry years when low flows of relatively warm water are further influenced by high ambient air temperatures. The heavy metal toxicity problem stems from high levels of copper, zinc, and other metallic ions in Spring Creek, which discharges into Keswick Reservoir. The metals originate from several inactive mines in the Spring Creek basin. During heavy runoff periods, when Spring Creek Reservoir spills, heavy metal concentrations can become high enough to kill fish in Keswick Reservoir and the Sacramento River.

Fishery Resource. Eight species of anadromous fish and over 60 species of resident fish are found in the Sacramento River. The major anadromous species are chinook salmon, steelhead trout, striped bass, American shad, and white sturgeon. Only chinook salmon and steelhead trout run upstream from the Red Bluff Diversion Dam in significant numbers. These fish occur throughout the main stem of the river and in accessible reaches of tributary streams.

Four runs or races of chinook salmon occur in the Sacramento River and its tributaries. These are the fall, late fall, winter, and spring runs. Each run is a genetically distinct race that migrates into the river and reproduces within a specific time period and location. Collectively, they comprise the primary source of chinook salmon caught in California's ocean. They also contribute significantly to the ocean fisheries of Oregon and Washington. Because of the different migration and spawning periods of these runs, salmon at various life stages are found in the mainstream Sacramento River during every month of the year. These life stages may consist of the adult fish, incubating eggs, developing alevins or sac fry, emergent fry, fingerlings, and subyearling juveniles. The name of each run generally denotes when adult spawners begin to migrate into the river.

From 1971 to 1982, all chinook salmon runs in the Sacramento River and tributaries upstream from the mouth of the Feather River averaged an estimated 136,000 annually (Table 10). The fall run is the largest and most widely distributed; the winter run is the next largest. The estimated average annual net economic (business related) value of all the runs to the commercial and sport fisheries is about \$20 million, and somewhat higher based on willingness to pay.

The various runs have different preferences regarding spawning areas, but all spawn either in the main stem of the Sacramento River in the 100-mile reach between Hamilton City and Keswick Dam, or in tributaries to this reach. Major changes have occurred in the distribu-

tion of fall run spawning stocks in the main stem Sacramento River during the past 25 years. The most evident trend has been a reduction in spawning populations above Red Bluff Diversion Dam and a significant, but lesser, increase below the dam. Late fall and winter run salmon spawning also has declined above Red Bluff Diversion Dam in recent years.

Steelhead trout, a prized sport fish, spawn in the upper reaches of tributary streams where year-round cold water occurs. Very few, if any, spawn in the main stem of the Sacramento River. The average number of steelhead counted annually at Red Bluff Diversion Dam for 1966 through 1982 was about 7,000, but less than 3,000 were counted each year from 1980 through 1982.

Table 10
CHINOOK SALMON SPAWNING STOCKS IN THE SACRAMENTO RIVER SYSTEM
(in Thousands of Fish)

Year	Sacramento River System Above Red Bluff (Excluding Battle Creek)				Battle Creek ¹	Sacramento River Mainstream Below Red Bluff ²	Other Tributaries ³	Total Sacramento River System Above Feather River	
	Late				Fall	Fall	All Combined	Fall	All Runs
	Fall	Fall	Winter	Spring					
1971	59	17	53	6	5	23	5	87	168
1972	36	33	28	7	5	15	3	56	127
1973	44	22	23	7	8	17	6	69	127
1974	49	6	19	4	4	28	8	81	126
1975	55	18	23	10	5	36	15	96	162
1976	57	16	33	25	5	36	1	98	173
1977	40 ⁴	9	16	13	--	46	3	88	127
1978	35	12	25	6	4	48	3	87	133
1979	48	10	2	3	13	67	2	130	145
1980	22	9	1	9	14	30	2	67	87
1981	29	7	20	21	17	43	10	92	147
1982	19	5	1	23	27	24	9	70	108
Average	41	13	20	11	9	35	6	85	136

¹ Includes spawners collected for Coleman Fish Hatchery.

² No estimates for races other than fall run chinook salmon.

³ Includes minor streams that a few hundred salmon enter regularly.

⁴ Includes Battle Creek.

Source: California Department of Fish and Game.

Rare, Threatened, and Endangered Species. Six rare, threatened, or endangered animal species occur in or near the Sacramento River and Shasta Lake (see Table 6). Four rare or endangered plant species also occur here (see Table 7).

Trinity River

The Trinity River drains a mountainous watershed of 2,846 square miles in northwestern California. This is an area of high precipitation, which gives the river a mean unimpaired annual flow volume of nearly 4 million acre-feet (1894-95 through 1946-47) near its confluence with the Klamath River. The reach of the Trinity potentially affected by the Proposed Action or No Action is the 40 miles downstream from Lewiston Dam to the confluence with the North Fork Trinity River.

Project Facilities. The Trinity River Division of the CVP includes two dams on the Trinity River: Trinity Dam, which impounds Clair Engle Lake; and Lewiston Dam, which impounds Lewiston Lake. Mean unimpaired annual flow volume above Lewiston is 1.26 million acre-feet (1894-95 through 1970-71). Clair Engle Lake has a storage capacity of 2,448,000 acre-feet. Lewiston Lake, 7 miles downstream, creates an afterbay for Trinity Dam and allows diversion into the 10.7-mile Clear Creek Tunnel, which conveys Trinity River water to Judge Francis Carr Powerplant and Whiskeytown Lake, in the drainage of the Sacramento River.

Clair Engle Lake offers recreation opportunities in the form of camping, boating, water-skiing, swimming, fishing, and hunting. Recreation use was 600,000 visitor days in 1978, down from 2 million in 1975. With water low in nutrients, Clair Engle Lake is not considered highly productive, yet it supports both warmwater and coldwater fish populations.

Fishery Resource. The reach below Lewiston Dam provides spawning and rearing habitat for fall run and spring run chinook salmon, coho salmon, steelhead trout, and some resident trout. This reach is the major spawning area for fall run chinook salmon in the entire Trinity River drainage.

Trinity River Fish Hatchery, built by the Federal Government as a mitigation feature of the Trinity River Division, CVP, is located immediately below Lewiston Dam and raises fall run and spring run chinook salmon, coho salmon, and steelhead trout.

The fishery supported by the river and hatchery contributes to the major sport and Indian fisheries of the more extensive Trinity/Klamath system and to the associated sport and commercial fishery in the Pacific Ocean.

Upriver fishery resources have been negatively impacted by the Trinity project, land use practices, timber harvest, road construction, and fishing. So far, mitigation measures have been largely ineffective at maintaining preproject levels of fish. Recently, some recommendations of the Trinity River Fish and Wildlife Task Force have been implemented by restoring gravel spawning beds, removing sand, and increasing flows below Lewiston Dam. Releases from the dam since 1980 have been 285,000 acre-feet annually -- more than double the previous minimum releases -- plus additional releases for flood management. The Task Force recommended a more extensive long-term fish habitat and hatchery program. Congress authorized and funded the Trinity River Basin Fish and Wildlife Restoration Program.

Rare, Threatened, and Endangered Species. The bald eagle occurs near Whiskeytown Reservoir and Clair Engle Lake, as indicated in Table 6.

Feather River

The Feather River is a major tributary, joining the Sacramento River near Verona, 21 river miles above Sacramento. Above Oroville Dam, the Feather River drains 3,634 square miles of watershed with an average annual runoff over the past 80 years of 4.2 million acre-feet. Below Oroville Dam, an additional 2,297 square miles of watershed contributes 1.5 million acre-feet annually, principally by two large tributaries, the Yuba River and the Bear River. The reach of the Feather River potentially affected by the Proposed Action or No Action is the 45-mile reach between Oroville Dam and the confluence with the Sacramento River.

Project Facilities. The northernmost features of the State Water Project are located on the Feather River and its tributaries. Three reservoirs on upper tributaries -- Frenchman Lake, Antelope Lake, and Lake Davis -- have a combined storage capacity of 162,414 acre-feet and provide for local irrigation, recreation, and incidental flood control.

Lake Oroville, impounded behind Oroville Dam on the main stem of the Feather, is the key storage facility of the SWP. The lake has a capacity of about 3.5 million acre-feet, a maximum surface area of nearly 16,000 acres, and a shoreline of up to 167 miles.

Normal releases from Lake Oroville are made through the intake to the Edward Hyatt Powerplant. The intake structure is designed so it can draw from various depths in the reservoir pool, thus allowing adjustments in the temperature of the release water.

After going through the power plant, the water enters Thermalito Diversion Pool, created by Thermalito Diversion Dam. Certain fish maintenance flows are released directly from this dam to the river, but greater volumes are diverted to two irrigation canals, the Feather

River Fish Hatchery, and Thermalito Powerplant. Four canals divert from the afterbay of Thermalito Powerplant. Return flows from the fish hatchery and Thermalito Afterbay rejoin the river.

The Oroville-Thermalito complex controls potential floodwaters, conserves water for release downstream, stores water for power generation, and provides recreation opportunities. Recreation use at Lake Oroville peaked at 800,000 visitor days in 1981. The lake supports considerable warmwater and coldwater fish populations.

Fishery Resource. Construction of Oroville Dam eliminated spawning areas for salmon and steelhead upstream of the dam. To compensate for this loss, the Department of Water Resources built the Feather River Fish Hatchery downstream of Oroville Dam on the northern bank of the Feather River. Feather River Fish Barrier Dam, 1/2 mile downstream of Thermalito Diversion Dam, diverts migrating salmon and steelhead into the Feather River Fish Hatchery. Here, a large number of adult fish can be trapped, held, and artificially spawned, or moved into the spawning channel.

Most of the 40-mile reach of the Feather River below the Fish Barrier Dam is available for natural spawning. Minimum flows are maintained in the 5-mile "low flow section" between the Fish Barrier Dam and the river outlet from Thermalito Afterbay. About 80 percent of the natural spawning occurs within this reach.

The 36-mile reach of the Feather River below the Thermalito Afterbay river outlet, known as the "high flow section", receives a minimum flow of about 1,700 cfs and accommodates about 20 percent of the naturally spawning salmon -- all within the upper half of this reach. The entire 40-mile reach below the Fish Barrier Dam is used for juvenile salmon rearing. Spawning escapement totals about 50,000 chinook salmon, mostly fall run with some spring run, of which from

3,000 to 5,000 enter the hatchery. Other species include American shad, striped bass, steelhead trout, and many resident warmwater and coldwater species.

Rare, Threatened, and Endangered Species. Five rare, threatened, or endangered animal species occur near the Feather River and Oroville Lake (see Table 6).

American River

The American River drains a 1,921-square-mile area in the north-central portion of the Sierra Nevada. With mean annual unimpaired runoff estimated at 2.6 million acre-feet (at Fair Oaks, 1894-95 through 1970-71), the American River is a major tributary to the Sacramento River. The section of the American that might be affected by the Proposed Action or No Action is the 25 miles between Nimbus Dam and the mouth. This entire reach is within the Sacramento metropolitan area.

Project Facilities. CVP facilities on the American River include Folsom Dam and Reservoir, with 1,010,000 acre-feet of storage capacity, and Nimbus Dam, which impounds Lake Natoma as an after-bay for Folsom Dam. These facilities regulate riverflow for irrigation, power, flood control, municipal and industrial use, and other purposes. Folsom Lake is heavily used for recreation, with an 18,000-acre park that is the most popular unit of the California State Park System. Recreation use of Folsom Lake and Lake Natoma runs about 2 million visitor days annually. Fishing, swimming, and water-skiing are the main attractions.

Fishery Resources. The American River and associated backwaters and dredger ponds downstream from Nimbus Dam support at least 41 species of fish, including chinook salmon, steelhead trout, striped bass, and American shad. Operation of Folsom and Nimbus dams, which were com-

pleted in 1955, has favorably affected fish populations, particularly of fall run chinook salmon by changing flow releases to improve habitat. Improvement of the fishery can also be attributed to successful operation of the Nimbus Salmon and Steelhead Hatchery, below Nimbus Dam.

For the period 1969 to 1981 the spawning escapement of salmon to the river and Nimbus Salmon and Steelhead Hatchery averaged 47,500 fish. Of these, about 60 percent were produced from fish spawning naturally in the river and 40 percent from hatchery operations. Steelhead trout escapement, supported entirely by the hatchery, runs as high as 15,000 to 20,000 annually. Unknown, but high, numbers of striped bass and American shad also ascend the American River and provide good angling.

Angling for all species in the American River totals about 150,000 to 200,000 angler days annually. Chinook salmon from the American support about 60,000 saltwater angler days and a commercial harvest of 985,000 pounds annually.

Rare, Threatened, and Endangered Species. Three rare, threatened, or endangered animal species occur near the lower American River and Folsom Lake (see Table 6). One endangered plant species occurs here (see Table 7).

Environmental Consequences, Rivers and Reservoirs

The Proposed Action and the No Action cases could differ in their effects on rivers and reservoirs controlled or operated by the CVP and SWP. The differences would arise in critical years. With the Proposed Action, both projects would be operated in all years to meet the Delta water quality and outflow requirements contained in Exhibit A of the proposed Coordinated Operation Agreement. In the No Action cases, it is assumed that in critical years the CVP or both the CVP and the

SWP would be operated for the CVP's Tracy standards, which require less water to be released from reservoirs than do the standards of Exhibit A.

The analysis in this section is based on an assumption that the water the two projects could save by meeting the Tracy standards instead of the Exhibit A standards in critical years would be retained in the reservoirs. This assumption maximizes the environmental differences between alternatives, but it is realistic only to the extent that retaining the saved water in the reservoirs would be one option for the projects. Another option would be releasing the saved water for delivery to project contractors to reduce the severity of deficiencies the contractors would be taking in critical years. The likelihood that the saved water would be delivered rather than retained increases with time; i.e., is greater at the 2020 level of development. To the extent that any water saved by operating for the Tracy standards rather than for the Exhibit A standards would be released instead of retained in the reservoirs, the environmental consequences of No Action would approach those of the Proposed Action as far as rivers and reservoirs are concerned.

Proposed Action

In critical years, the Proposed Action would place greater demands on CVP reservoirs than would necessarily exist in any No Action case. The Proposed Action would also place greater critical-year demands on the SWP's Oroville Reservoir than would exist in No Action, Case A.

Sacramento River and Shasta Lake.
Operation studies comparing the Proposed Action to the No Action cases indicate slightly increased spring flows, occasional flow reductions during high release periods, and lower Shasta Lake levels during critical years with the Proposed Action.

The lower Shasta Lake levels would cause increases in the temperature of water released to the upper Sacramento River below the dam. Significant temperature increases were found for three critical years: 1931, 1933, and 1934. The operation studies included 83 years, 1895 to 1977, of which 6 qualified as critical by at least one set of critical-year criteria. Temperature increases in the 3 years showing significant increases ranged from 1 to 2 degrees Fahrenheit at the 1980 level of development and from 1 to 4 degrees at the 2020 level.

Table 11 shows projected upper Sacramento River temperatures with the Proposed Action and with No Action for water year 1933, the year of maximum temperature differences between Proposed Action and No Action. The projected temperatures were based on mathematical reservoir and river model studies that simulated 1933 hydrologic and temperature conditions.

Temperatures exceeding 56°F adversely affect the survival of salmon eggs and alevins (salmon fry with yolk sac still attached). Water temperatures in excess of 60°F also cause advanced maturation of female salmon spawners, resulting in increased adult prespawning mortality. The Department of Fish and Game's estimates of mortality of chinook salmon eggs and fry at 1°F increments of temperature increase above 56°F are shown below.

<u>Incubation Temperature (°F)</u>	<u>Mortality (%)</u>
56	8
57	10
58	13
59	30
60	50*
61	80
62	100

*No Data

Table 11

POTENTIAL TEMPERATURE IMPACTS OF THE PROPOSED ACTION IN A CRITICALLY DRY YEAR (1933)
(Estimated Mean Monthly Temperatures in Degrees Fahrenheit)

Location and Criteria*	1980 Level of Development							2020 Level of Development						
	May	Jun	Jul	Aug	Sep	Oct	Nov	May	Jun	Jul	Aug	Sep	Oct	Nov
Sacramento River at Keswick														
Proposed Action	47	49	53	56	58	57	54	48	52	59	62	62	59	56
No Action	47	48	52	55	57	56	54	47	50	55	58	60	58	56
Increase With Proposed Action	0	1	1	1	1	1	0	1	2	4	4	2	1	0
Sacramento River at Cottonwood														
Proposed Action	51	53	59	60	60	57	53	53	56	62	63	63	59	55
No Action	51	53	58	59	59	57	53	53	55	59	61	61	58	55
Increase With Proposed Action	0	0	1	1	1	0	0	0	1	2	2	1	1	0
Sacramento River at Red Bluff														
Proposed Action	53	55	61	61	61	57	52	55	57	64	64	63	59	54
No Action	53	55	60	60	60	57	52	55	56	62	62	62	58	54
Increase With Proposed Action	0	0	1	1	1	0	0	0	1	2	2	1	1	0
Trinity River at Lewiston**														
Proposed Action	-	-	-	53	-	62	61	-	-	-	49	-	49	46
No Action	-	-	-	52	-	59	57	-	-	-	49	-	48	46
Increase With Proposed Action	-	-	-	1	-	3	4	-	-	-	0	-	1	0
American River at Nimbus														
Proposed Action	61	65	-	71	-	62	-	64	68	-	72	-	62	-
No Action	60	64	-	71	-	61	-	64	68	-	72	-	62	-
Increase With Proposed Action	1	1	-	0	-	1	-	0	0	-	0	-	0	-

* No Action refers to all cases of that alternative.

**Evaluated for 1932; impacts less in 1933.

- Not Evaluated.

Considered on a worst-case basis (i.e., hydrology of critical year 1933 and maximum possible differences in storage levels at Shasta Lake), the Proposed Action would result in water temperature increases (compared to No Action) that would adversely affect winter run salmon eggs and alevins during the incubation and development period from July through September. These increases would be incremental to background temperatures that have reached or exceeded the maximum desired temperature of 56°F. At the 1980 operational level, incremental

mortality attributable to the Proposed Action would range from 2 to 20 percent because of a 1- to 2-degree increase in mean monthly river temperature (see Table 12). The impacts would primarily occur to:

- ° The late spawning segment of the run (with resulting pre-emergent fry still in the gravels during September), and
- ° That portion of the run spawning in the river reach near Red Bluff.

Table 12

ESTIMATED SACRAMENTO RIVER MEAN MONTHLY TEMPERATURE INCREASE AND
CORRESPONDING INCREASE IN MORTALITY OF CHINOOK SALMON EGGS AND FRY
POTENTIALLY RESULTING FROM THE PROPOSED ACTION*

Level of Development	Location	June		July		August		Sept.		Oct.		Nov.	
		°F	%	°F	%	°F	%	°F	%	°F	%	°F	%
1980	Keswick	1	0	1	0	1	8	1	3	1	2		N/C
	Cottonwood	N/C		1	17	1	20	1	20		N/C		N/C
	Red Bluff	N/C		1	30	1	30	1	30		N/C		N/C
2020	Keswick	2	0	4	30	4	87**	2	50**	1	17		N/C
	Cottonwood	1	8	3	70**	2	20**	2	20**	1	17		N/C
	Red Bluff	1	2	2	0**	2	0**	1	0**	1	17		N/C

* Base level is that of No Action (same for Cases A, B, and C).

** Total mortality will be 100 percent.

N/C = No Change

At the 2020 operational level, again in worst-case (1933) conditions, incremental mortality of winter-run salmon with the Proposed Action would range from 13 to 70 percent, because of a 2- to 4-degree increase in background mean monthly temperature that would already exceed 56°F. Essentially, the only winter run salmon spawning and incubation habitat remaining in the Sacramento River under these conditions with the Proposed Action at 2020 levels would be for early spawning segments immediately below Keswick Dam. Even then, an August mean temperature of 60°F (4°F induced by the Proposed Action) would result in 50 percent mortality of winter-run salmon eggs and alevins.

Temperature increases attributable to the Proposed Action under worst-case (1933) conditions would also adversely affect spring-run chinook salmon in the main stem of the Sacramento River. The major impact at the 1980 level would be on September spawners, which would suffer a 10 to 20 percent reduction in egg survival (see Table 12). Spring-run spawning at Red Bluff would be eliminated in September because of high water temperature (62°F). At the 2020 level, the mean October river temperature for worst-case (1933) conditions is projected at 61°F as far downstream as Red

Bluff. This condition would be expected to result in incremental mortality of 17 percent and a total mortality of 30 percent.

Fall-run chinook salmon would be impacted only slightly by worst-case conditions with the Proposed Action at the 1980 operating levels (2 percent incremental mortality in October of eggs deposited downstream of Keswick; see Table 12). However, at the 2020 operational level, fall run spawning success during critically dry years would be reduced more significantly. Mean monthly temperature increases of 1°F would result in 59°F temperatures as far downstream as Red Bluff during October, resulting in loss of 17 percent of eggs deposited during this period. There would be no impact in November.

Although Table 12 shows potential mortality impacts, it does not quantify actual impacts on the salmon runs. In other words, an impact of 100 percent in a certain month may not be significant if few salmon are present at that time or location. To better assess salmon impacts, a mathematical model was used to estimate overall temperature-related mortalities. The model computes salmon losses from daily river temperatures based on historical distributions of

runs by river location and time of year. The temperature-mortality criteria listed above were used, along with criteria for fingerlings.

Table 13 shows model estimates of salmon run losses for 1933. As discussed above, the major impact is on the winter run because of the high summer river temperatures. The impacts on all runs combined, however, are only 4 percent at 1980 level and 8 percent at 2020, since impacts on the major fall run are relatively small.

Temperature impacts indicated for water years 1931 and 1934 were similar to 1933. In other critical years, the indicated temperature differences between the Proposed Action and No Action were too small to be meaningful, considering the accuracy of the model.

Regarding predicted thermal impacts to salmon, it should be recognized that these projections are based on less than 4 percent frequency of occurrence (3 years in 83) and that these effects may not occur under a different set of operating assumptions. Inherent in this Agreement is the commitment by both the CVP and SWP to meet adopted standards designed to protect this resource.

Coordinating operations of both protects to meet these standards is judged more beneficial to salmon overall than if these standards are not met.

Lower storage in Shasta Lake during the late fall and winter of critical years would provide less dilution capability for control of toxic metal discharges from the Spring Creek drainage. Higher Sacramento River flows with the Proposed Action would tend to offset this impact, however. Possible impacts on toxic metal concentrations and fish in the Sacramento River have not been quantified, but are not expected to be significant.

Any impacts on steelhead trout that might result from the Proposed Action's effects on Sacramento River flow and temperature would probably be minimal. Steelhead trout spawn primarily in the upper accessible reaches of tributary streams, and their spawning would therefore not be impacted by environmental changes in the main stem of the Sacramento River.

Operation studies were reviewed for potential seepage problems with the Proposed Action and no significant effects were found.

Table 13

SACRAMENTO RIVER TEMPERATURE-RELATED SALMON LOSSES -- 1933 (CRITICAL YEAR)

Level of Development	Criteria	Salmon Run Loss (Percent)				All* Runs
		Fall	Late-Fall	Winter	Spring	
1980	Proposed Action	37	25	25	41	34
	No Action	35	20	18	35	30
	Increase With Proposed Action	2	5	7	6	4
2020	Proposed Action	40	42	65	56	46
	No Action	37	33	40	54	38
	Increase With Proposed Action	3	9	25	2	8

* Weighted by historical salmon run size: (Fall 61.4%; Late-Fall 12.6%; Winter 18.1%; Spring 7.9%).

The lower storage levels in Shasta Lake would be expected to cause slight, but not significant adverse impacts on resident fish in that lake and on recreation use (see CEQA criteria in Appendix K). Table 14 shows recreation impacts. The reduction in average annual recreation use with the Proposed Action was estimated at less than one percent at both the 1980 and 2020 development levels.

Effects of Changing Annual Drawdowns to Cultural Resources. Increased drawdowns may adversely affect cultural resources in the drawdown zone by erosion and exposure to vandals. The expected impacts, by reservoir, are:

- ° Shasta -- By year 2020, a 4 percent increase of drawdowns of more than 100 feet is expected with the Agreement (Table 14). This will slightly increase erosion of cultural resources and their exposure to vandalism. If such a scenario does occur, the U. S. Forest Service and the Bureau of Reclamation will account for this potential in future cultural resources planning, with concurrence of the State Historic Preservation Officer.
- ° Clair Engle -- No changes in drawdown frequency are expected.
- ° Whiskeytown -- Less fluctuation in reservoir levels will occur. This should benefit those cultural resources in the drawdown zone.

Rare, Threatened, and Endangered Species. Nesting and wintering bald eagles at Shasta Lake or the Sacramento River would not be affected by the Proposed Action. Lower water levels in Shasta Lake could slightly reduce the numbers of warmwater fish, but availability of fish as food for eagles might actually improve. The extreme drawdown of Shasta Lake during the 1977 drought increased bald eagle productivity, probably because fish were concentrated in a smaller volume of water and sediment beds were exposed on tributary streams.

This allowed the eagles to easily spot dead or dying fish.

The Proposed Action would not affect Shasta salamander populations because the level of the lake would not increase. Neither would the Proposed Action affect the giant garter snake, Swainson hawk, peregrine falcon, California yellow-billed cuckoo, valley sagittaria, slender orcutt grass, greene's orcutt grass, or hairy orcutt grass. These species inhabit areas near the Sacramento River. They would not be impacted because the flow of the Sacramento River would not significantly change and, therefore, would not affect adjacent habitat.

Trinity River and Clair Engle Lake. The Proposed Action and its No Action alternative (all cases) would be no different in regard to flows provided for the Trinity River. Because of exports from the Trinity River drainage to the Central Valley, however, storage levels in Clair Engle and Lewiston reservoirs could differ between the alternatives, and this could cause differences in temperature of the release water.

Temperature differences indicated by 1980-level and 2020-level operation studies comparing the Proposed Action and No Action (all cases) are shown in Table 11. These differences are based on hydrology of the critical year 1932 and represent the maximum impacts found in any of the years studied. Temperature differences in spring months were considered insignificant.

Higher water temperatures with the Proposed Action in critical years such as 1932, as compared to temperatures that would exist with the No Action alternative, would be harmful to salmon in their spawning and incubating stages. The temperature increases in October and November would be especially harmful and could preclude successful hatching of fall spawning salmon. The Trinity River Fish Hatchery would be affected in the

same way as the natural spawning areas in the river, since its water source is the same. The temperature control facilities at the hatchery intake at Lewiston Dam are now being evaluated and may mitigate impacts on the hatchery.

Salmon impacts as described above may not occur under different operating assumptions; they represent less than 4 percent of the years studied as a worst case. The greater flexibility offered by the proposed action affords a greater level of protection to salmon resources than has previously existed. It is also judged that meeting the standards of the proposed action is more beneficial to salmon than if these standards were not met.

Water levels in Clair Engle Lake would be lower during critical years with the Proposed Action, as compared to No Action, but not enough to significantly

impact recreation or resident fish (see Table 14).

The Proposed Action would not affect bald eagle populations at Clair Engle Lake.

Feather River and Lake Oroville.
Operating SWP facilities on the Feather River to meet the standards of the Proposed Action's Exhibit A rather than the Tracy standards applicable in No Action, Case A, would cause increased drawdown at Oroville Reservoir and flow-related effects in the Feather River. Temperature-related effects would not be significant.

Operation studies indicate that differences between the Proposed Action and No Action, Case A, would be limited almost exclusively to critical years and the year immediately following.

Table 14

ANNUAL DRAWDOWN AND RECREATION VISITS AT SELECTED CVP RESERVOIRS
WITH AND WITHOUT COORDINATED OPERATION AGREEMENT
(1980 and 2020 Level of Development)

Reservoir	Drawdown* (feet)	Annual Recreation Visits** (millions)	Optimum Drawdown Frequency (percent)	Drawdown Frequency (% of Years)***			
				1980		2020	
				Without COA	With COA	Without COA	With COA
Shasta	0 - 20	4.9 - 5.3	78	16	16	29	29
	20 - 50	4.7 - 4.9	12	54	56	29	28
	50 - 70	4.0 - 4.7	2	12	8	17	17
	70 - 100	3.3 - 4.0	6	11	11	19	16
	Over 100	Less Than 3.3	2	7	9	6	10
Clair Engle	0 - 20	1.5	96	18	18	74	74
	20 - 45	1.2 - 1.5	4	38	38	16	16
	Over 45	Less Than 1.2	0	44	44	10	10
Whiskeytown	0 - 1	1.7	80	30	28	99	99
	Over 1	Less Than 1.7	20	70	72	1	1
Folsom	0 - 30	2.7 - 3.4	NA	14	14	5	5
	30 - 39	2.2 - 2.7		19	19	18	18
	Over 39	Less Than 2.2		67	67	77	77

* Drawdown = Full pool - August end-of-month storage.

** Recreation visits and drawdown criteria from "CVP Reauthorization", DES 80-47, 7/29/80.

*** Frequencies from operation studies: DWR-1980 Level (1922-1978); USBR-2020 Level (1895-1971).

NA Not Available.

In hydrology of the 11 years, 1922 to 1925, 1930 to 1936, and 1976 to 1978, at the 1980 level of development, there were 15 months in which flow differences between the two cases could have an effect on salmon. Of these 15 months, the Proposed Action was more beneficial for salmon in 11 months and less beneficial in 4 months. The net effect of the differences cannot be expressed in numbers of fish, but the Proposed Action would be slightly beneficial overall, as compared to No Action, Case A.

At the 2020 level of development, river-flows with the Proposed Action were more beneficial to salmon in 10 months and less beneficial in 3 months. The net effect would be slightly beneficial, and on about the same order of impact as would be observed at the 1980 level of development.

The outlet structure at Oroville Dam can reach deep into the pool to take water of acceptable temperature in all or nearly all reservoir storage conditions. For this reason, the temperature impacts of the Proposed Action on salmon would be negligible.

Increased drawdown during critical years could adversely affect resident fish and recreation use at Oroville Reservoir. Eagles wintering there would not be affected.

The slight changes in flow of the Feather River in the Proposed Action, as compared to No Action, Case A, would not affect adjacent habitat used by the giant garter snake, Swainson's hawk, peregrine falcon, or California yellow-billed cuckoo.

American River and Folsom Lake. Operating CVP facilities on the American River to meet the standards of the Proposed Action's Exhibit A rather than the Bureau's Tracy standards could result in adverse temperature changes similar to, but smaller than, those described for the Sacramento and Trinity rivers. The difference would be 1°F in May, June,

and October of critical year 1933 (1980 level of development). Temperatures in these instances would be severely limiting for salmon spawning and rearing either with or without the Proposed Action. The impact of the incremental temperature change attributable to the Proposed Action (as compared to No Action, all cases) is probably on the order of several thousand fish lost.

The Proposed Action would occasionally cause increased flows (as compared to No Action, all cases) below Folsom Dam and would less frequently cause decreased flows. The net effect would benefit salmon slightly, but this beneficial effect would be of a lesser order than the Proposed Action's adverse effect caused by temperature increases.

Meeting the Exhibit A standards of the Proposed Action would require that Folsom Lake be drawn down farther in critical years than it might be if only the Tracy standards of No Action were being met. The increased drawdown could adversely affect resident fish and recreation use, although, as shown in Table 14, it is not significant. Also, the pumping requirements for water delivered directly from Folsom Lake would be increased, and some of the water users relying on this source could experience more severe water shortages.

The Proposed Action would not significantly increase flows of the American River and therefore would not affect adjacent habitat used by the valley elderberry longhorn beetle, Swainson's hawk, peregrine falcon, or sticky orcutt grass. Bald eagles would not be affected either.

No Action

In the No Action alternative, facilities of the CVP, the SWP, or both would be operated to meet the Bureau's Tracy standards in critical years and the standards of Exhibit A in all other years. The three No Action cases are

the same in regard to operation of CVP facilities -- they always operate to Tracy standards in critical years -- so all three cases are the same in regard to effects on the Sacramento, Trinity, and American rivers. The three cases are different, however, in regard to operation of SWP facilities, and corresponding differences would be observed in the Feather River.

Sacramento River and Shasta Lake. A proposed program of improvements, independent of the Proposed Action and No Action, should eventually restore chinook salmon and steelhead populations to levels exceeding those of the 1970s. The improvements would consist of habitat rehabilitation (gravel restoration), pollution control measures planned for Spring Creek near Keswick Dam, more efficient and expanded hatchery operations at Coleman Fish Hatchery and the Tehama-Colusa spawning channels, and possibly improvements in flow and water quality from Shasta Dam. Many of these potential improvements are being examined in the Bureau of Reclamation's Central Valley Fish and Wildlife Management Study, an 8-year, \$2,650,000 appraisal-level study seeking opportunities to improve fish and wildlife resources throughout the Central Valley. Structural and operational modifications to improve fish passage at the Red Bluff and Anderson-Cottonwood Irrigation District diversion dams and tributary dams have also been proposed. Some proposals are now being tried to evaluate their effectiveness.

In the absence of measures to control temperatures of releases from Shasta Dam, chinook salmon resources in the Sacramento River will decline significantly, primarily for mainstream spawning populations of winter, spring, and early fall run chinook salmon. These declines will result from increased summer and fall water temperatures because of reduced Shasta Lake levels. In this regard, consequences of No Action and the Proposed Action would be the same, except the salmon declines attributable to high summer and fall

water temperatures could be aggravated with the Proposed Action, at least in critical years.

The potential for erosion problems on the Sacramento River would be greater with No Action than with the Proposed Action, because high flow periods would occur more frequently if higher carry-over storage were maintained at Lake Shasta.

No Action would have no adverse impacts at Shasta Lake, as compared to the Proposed Action.

Trinity River and Clair Engle Lake. Operating CVP facilities on the Trinity River as part of an overall CVP operational scheme that involves meeting only the Tracy standards in critical years would not have adverse impacts on the Trinity River and Clair Engle Lake, as compared to the Proposed Action.

Feather River and Lake Oroville. Impacts of No Action, Case A, in which SWP facilities are operated to meet only the Tracy standards in critical years, would be the reverse of the slightly beneficial impacts described for Proposed Action; i.e., conditions for salmon, as compared to conditions with the Proposed Action, would be less favorable. Impacts of No Action, Case C, in which SWP facilities are operated to fully meet Exhibit A or Decision 1485 standards even though the CVP is operating only to meet Tracy standards, would be the same as the impacts of the Proposed Action. Impacts of No Action, Case B, in which the SWP is operated to provide its share of the water needed to meet the Exhibit A standards, would also be the same as the impacts of the Proposed Action.

American River and Folsom Lake. No Action would have no adverse impacts, as compared to the Proposed Action. The slightly beneficial flow impacts observed in the American River with the Proposed Action would be foregone, but so would the more significant (although slight) adverse temperature impacts.

Existing Central Valley Project Power Capabilities

The Central Valley Project provides a significant portion of the hydroelectric power available for use in Northern California. Its nine power plants and two pumping-generating plants have an installed capacity of 1,750 megawatts (MW). Pacific Gas and Electric Company, the major power supplier in Northern California, has a net generating capacity of 18,700 MW. Because 40 percent of this capacity depends on oil or gas-fired facilities, hydroelectric facilities, which do not depend on imported and non-renewable fuels and do not contribute to air pollution, are especially important.

Most of the CVP power plants are just downstream from the storage reservoirs and are operated in conjunction with the water demands on these reservoirs. Thus, power generation is directly related to the irrigation, municipal and industrial, and other types of demands for project water. Recognizing that these water demands would be seasonal (with much larger releases being made during summer), CVP power plants were designed to generate peaking power. Since peaking power alone cannot satisfy the power requirements of CVP power customers, and since peaking is more efficiently used when integrated with baseload power, the Bureau of Reclamation entered into a support contract (Contract 2948A) with PGandE. The Western Area Power Administration (Western) now administers this contract. Contract 2948A provides for the delivery of peaking power from CVP power plants into the PGandE system; PGandE, in return, delivers power, as required, to Western's preference power customers.

Power generated from the CVP system is dedicated first to meeting the power requirements of the project's pumping facilities. The remaining capability of the project's power facilities is used to provide commercial power to the various preference customers (irrigation

districts, municipalities, military installations, and various Federal and State government installations) in Northern California.

The commercial power accomplishments of the CVP are defined by two quantities: project dependable capacity (PDC) and energy. PDC is that portion of the CVP's installed capacity that can be relied on to meet preference customer loads under adverse hydrologic conditions. Energy (for commercial power purposes) is the electric energy generated as water is released from CVP reservoirs through the various power plants, less the demands of the CVP's energy-using facilities. In normal years, the CVP's plant hydroelectric generation for commercial power purposes exceeds 3,500 gigawatt-hours. The level of project dependable capacity the CVP provides is currently under dispute between Western and PGandE.

The CVP is contractually committed to meet the preference customer load of 1,152 MW through the year 2004. Western's Power Marketing Plan (October 1981) indicates that the CVP will become energy short by 1991 unless it acquires additional power supplies. Western is actively searching for and has begun contracting for additional power.

Effect on Central Valley Project Power Capabilities

CVP power production capabilities with the Proposed Action and with No Action were compared using a computerized power operation model of the CVP. PDC was evaluated over the historical dry period, 1930 through 1934, in accordance with criteria established by the original Contract 2948A reclamation study.

Both 1980 and 2020 levels of hydrology were used in the model. Hydrologies for these levels of development were obtained by modifying historical hydrologic data to reflect year 1980 or year 2020 demands.

Proposed Action

The Proposed Action, which would entail both the CVP and SWP meeting Exhibit A standards in every year, would not significantly affect CVP average annual energy generation. No significant difference in average annual energy generation between the Proposed Action and No Action was observable in power operation studies at either the 1980 or 2020 level of development.

No Action

Under all the No Action cases, the CVP would abide by the Exhibit A standards in all years except critically dry years, when the CVP would meet only the Tracy standards. This mode of operation would have no adverse effect on CVP power production capability, as compared to the Proposed Action.

Related Actions and Projects

The proposed Agreement would occupy a relatively central position, though not a commanding one, in the extensive and complicated system of water development that serves the people of California. The Agreement can be related in some way to all of the existing water projects -- Federal, State, and local -- in the 40 percent of California that drains to the Sacramento-San Joaquin Delta, and because of imports to and exports from the basin, it can be related to projects in Southern California and the north coastal area as well. This section will discuss certain of these related projects. In no case are the impacts of these projects impacts of the Proposed Action (executing the proposed Agreement).

Facilities Named in the Agreement

The facilities or projects whose operations are related to the Agreement are those named in its Articles 3 and 5.

The Article 3 facilities (diagrammed in Figure 16) are involved in the concept of storage withdrawals, which is important to the sharing formula of Article 6. The Article 5 facilities are related to Exhibits B-1 and B-2 of the Agreement, and Exhibit B-1 in turn is related to the sharing formula. The sharing formula in Article 6 is based on computations that operated the facilities in Article 5 to meet the water supplies specified in Exhibit B-1.

Article 5 Facilities. The facilities listed in Article 5 can affect or be affected by the Coordinated Operation Agreement in three ways:

- ° By involvement in a storage withdrawal as defined in Article 3. In this category are the following Federal facilities: Shasta Lake, Keswick Reservoir, Clair Engle Lake, Lewiston Lake, Whiskeytown Lake, Folsom Lake, Lake Natoma. The following State facilities are in this category: Lake Oroville, Thermalito Forebay, Thermalito Afterbay, Thermalito Diversion Dam Reservoir, Lake Davis, Antelope Lake.
- ° By affecting export or export capability. In this category are the following Federal facilities: Contra Costa Pumping Plant No. 1, Tracy Pumping Plant, San Luis Reservoir, O'Neill Forebay. The following State facilities are in this category: Harvey O. Banks Delta Pumping Plant (including Clifton Court Forebay), San Luis Reservoir, O'Neill Forebay, Lake Del Valle, Pyramid Lake, Castaic Lake, Silverwood Lake, Lake Perris.
- ° By affecting unstored flow available for export in the Delta. The Federal reservoirs Millerton and New Melones can affect unstored flow but cannot make storage withdrawals as defined in Article 3. They are discussed separately.

Friant Dam and Millerton Lake. Friant Dam is a Central Valley Project facility on the San Joaquin River, about 25 miles

northeast of Fresno. It impounds Millerton Lake, which has a capacity of 520,000 acre-feet. The 150-mile Friant-Kern Canal diverts water southerly from Friant Dam to the upper (southern) San Joaquin Valley. The Madera Canal, about 36 miles long, diverts water northerly from the dam.

Prior to construction of Friant Dam, the water now captured in Millerton Lake was used downstream by diverters along the San Joaquin River. These San Joaquin River flows have been replaced by Sacramento River water imported from the Delta and delivered to the San Joaquin Valley through the Delta-Mendota Canal.

Although operation of Millerton Lake influences Delta inflows, and releases from Friant Dam could on rare occasions add to the unstored flow available for export from the Sacramento-San Joaquin Delta, the operation of these facilities would not be governed by the Agreement. They are operated independently of other CVP facilities and are considered, along with existing local projects, as part of the background conditions upon which the affected parts of the Central Valley Project and State Water Project are superimposed.

New Melones Dam and Reservoir. New Melones Dam is on the Stanislaus River, about 60 river miles upstream from the confluence with the San Joaquin River. Operated by the Bureau of Reclamation as part of the Central Valley Project, the dam impounds up to 2,400,000 acre-feet of water.

About 450,000 acre-feet of storage space in New Melones Reservoir is used for flood control. By year 2020, 131,000 acre-feet of water per year from New Melones may supplement existing water supplies within the Stanislaus River basin and 49,000 acre-feet will be allocated to the Central San Joaquin Water Conservation District. Up to 70,000 acre-feet is used to maintain water quality in the Stanislaus and San Joaquin rivers, and 98,000 to 148,000 acre-feet is allocated for fish.

Uncontrolled releases down the spillway of New Melones Dam could add to the unstored flow available for export from the Delta, but such releases would occur infrequently. If releases from New Melones were increased for water quality or fish, unstored flow in the Delta would increase. This would necessitate new operation studies for the Coordinated Operation Agreement, and renegotiation might be required.

Other Projects and Actions

This category includes proposed, potential, and existing projects or actions not named in Article 5. Any future action that could have significant environmental impacts would be subject to supplemental or independent environmental impact reporting requirements and public environmental review. Construction by either of the parties to the Agreement of any new facility that would change the water supply yield of either the Central Valley Project or the State Water Project would set in motion the negotiation process provided in Articles 14 and 16. A simulation study would be performed to determine the effect of the action or facility on the yields of the two projects. Any increase in yield would be credited to the party that built the facility or to both parties if the new facility was a joint venture.

Some projects or actions discussed in this section involve "wheeling": conveyance of one project's water through facilities of the other project. Such wheeling is not covered by the Coordinated Operation Agreement, except under Article 10(a): "Either party may make use of its facilities available to the other party for pumping and conveyance of water by written agreement."

The projects or actions discussed below are not in order of importance.

Suisun Marsh Plan of Protection. In Decision 1485 (1978), the State Water Resources Control Board ordered the

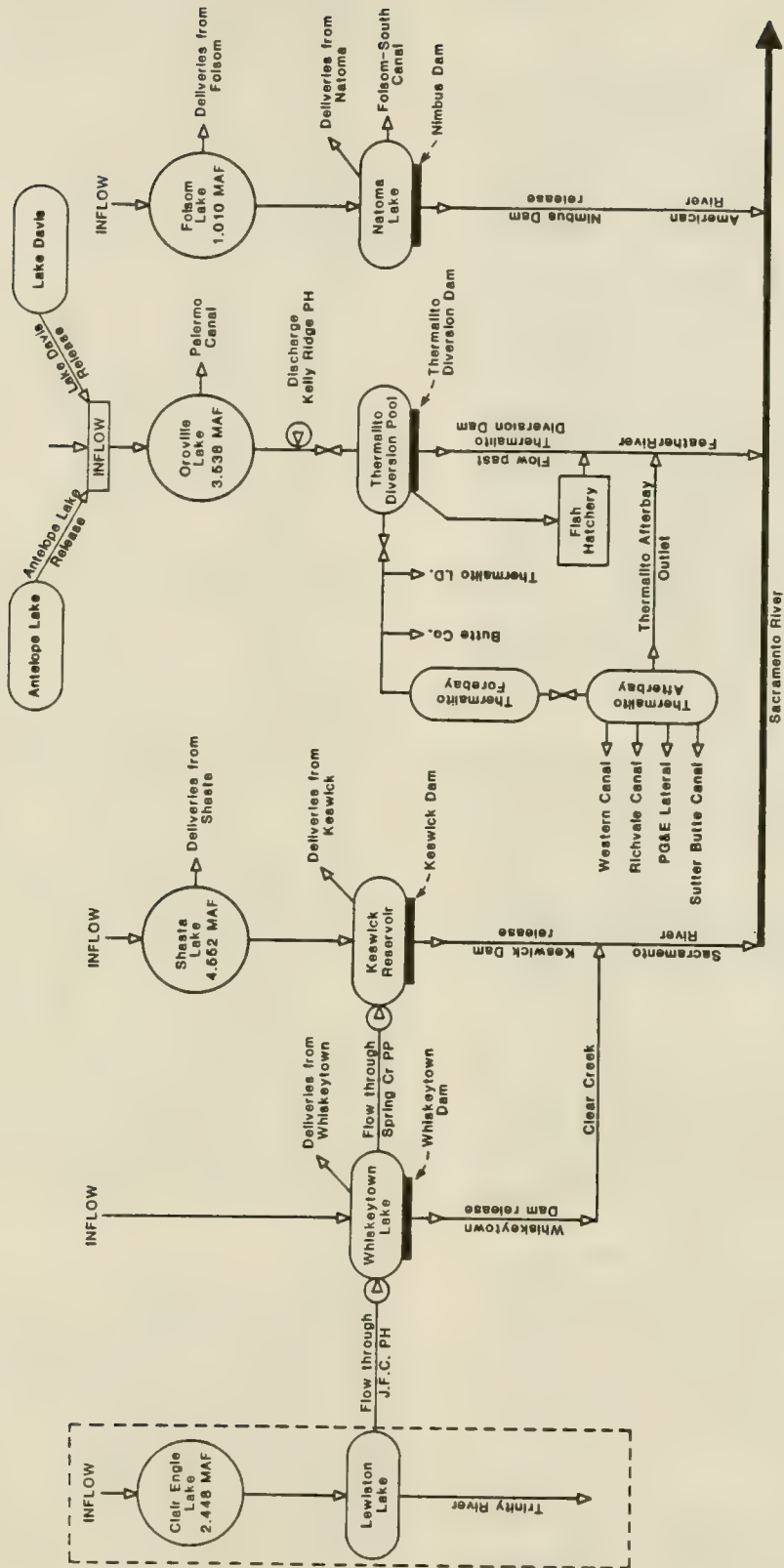


Figure 16: CVP AND SWP FACILITIES INVOLVED IN STORAGE WITHDRAWALS

concerned "permittees", meaning the Department of Water Resources and the Bureau of Reclamation, to develop and implement a plan for protection for Suisun Marsh by July 1, 1979. The Department published the required plan early in 1984. Full implementation will be staged over a period of years.

The plan calls for construction of facilities to improve the flow and distribution of Sacramento River water entering the marsh through Montezuma Slough. These facilities would be in addition to the "initial facilities" already constructed. First, a control structure would be placed across Montezuma Slough. When necessary to maintain desired water quality conditions in the marsh, the control structure would be operated with the tides so as to encourage east to west flows that draw from the Sacramento River, and to block west to east flows that draw from Grizzly Bay (part of Suisun Bay).

After Montezuma Slough Control Structure is in place, its effectiveness would be tested for several years to determine the need for additional facilities in the form of ditches for conveying water from Montezuma Slough into backwater areas of the marsh. The Department's Plan of Protection describes the proposed ditches.

Part of the Plan of Protection is a contract being negotiated among the Department, the Suisun Resource Conservation District, the Department of Fish and Game, and the Bureau of Reclamation. The contract provides that the Suisun Marsh water quality requirements of Decision 1485 that were due to become effective October 1, 1984, will be met except in certain conditions of severe water shortage. In such conditions, the marsh would have to accept a deficiency in its water supply, as would other project water users.

Four Additional State Pumps. The Department of Water Resources intends to install the last four of eleven pumps

originally planned for Harvey O. Banks Delta Pumping Plant, increasing the plant's maximum pumping capacity from 6,400 to 10,300 cubic feet per second. The additional pumps are needed to:

- ° Provide standby pumping capacity to compensate for scheduled and unscheduled outages of the existing units.
- ° Reduce on-peak power and energy requirements for SWP pumping.
- ° Increase the firm yield of the SWP.

The amount of energy saved and yield realized would depend on overall project operation.

Environmental and socioeconomic impacts of the proposed pumps are described in a 1982 draft environmental impact report.

Delta Water Transfer Facility. Both the Department and the Bureau have proposed construction of Delta water transfer facilities to more efficiently move project water from the Sacramento River to the export pumps in the southern Delta. The Peripheral Canal, described in the Department's Bulletin 76 (1978) and in the Bureau's "Peripheral Canal Unit" feasibility report (1966), would be such a facility. The Peripheral Canal, however, was one of the water resources development projects included in State Senate Bill 200 (1980). Senate Bill 200 was submitted to a statewide referendum vote in June 1982 and rejected by the voters.

Recently, the Department has suggested alternative water transfer facilities that would use existing Delta channels or existing channels plus one or more new channels. These plans differ from the Peripheral Canal in that the latter would have been one long and entirely new channel skirting the eastern periphery of the Delta. Construction of a Delta water transfer facility is one of the Department's highest priorities.

Among the purposes of a Delta water transfer facility would be to improve conditions for Delta fish and export water and to efficiently use stored water supplies by reducing or eliminating reverse flow conditions.

A Delta water transfer facility would improve the reliability of the supplies of the SWP, the CVP, or both, depending on whether the new facility were a joint facility and on how it would be operated. Decisions on joint operating procedures for minimizing shortages during droughts might also be affected (see Article 9 of the Agreement).

North Bay Aqueduct. The Department of Water Resources proposes to build the North Bay Aqueduct as a State Water Project facility to deliver up to 60,000 acre-feet of water annually from the Delta to service areas in central Solano and Napa counties. A final environmental statement and environmental impact report on this project was completed in May 1982 /16/. Construction is scheduled to begin in 1984.

The North Bay Aqueduct would divert water from Cache Slough, a channel contiguous with the Sacramento River, and convey it westward in a pipeline to supply the cities of Fairfield, Vacaville, and Suisun City. Near the town of Cordelia, this pipeline would join an existing pipeline segment built in the late 1960s as North Bay Aqueduct Phase I. The Phase I segment serves Napa County and has been operating with water purchased from the Federal Solano Project.

Under the proposed Coordinated Operation Agreement, the North Bay Aqueduct would be considered an export facility for purposes of Article 5, because it would convey water out of the drainage of the Sacramento River and thus meet the definition of an export facility given in Article 16.

Water for the North Bay Aqueduct would come from State storage withdrawals and

from the State's share of unstored flow available in the Delta.

Southern Delta Facilities. Portions of the southern Delta area suffer from one or more of the following problems: poor water quality, inadequate water quantity, poor water circulation, and low water levels at certain times and locations. These problems can be attributed, in varying degrees, to one or more of five basic causes:

- ° Central Valley Project operations.
- ° State Water Project operations.
- ° Nonproject water users.
- ° San Joaquin River degraded inflow.
- ° Existing channel conditions.

At times, quantities and qualities of inflow to the Delta from the San Joaquin River do not meet minimum needs of agricultural diversions in the southeastern Delta. This problem is accentuated by water use upstream in the San Joaquin Valley and poor quality irrigation return flows, although since its completion, releases from New Melones Reservoir have lessened the problem.

Some of the plans that have been proposed by the Department for Delta water transfer facilities would greatly reduce the problem of water level drawdown in the southern Delta, or at least that part of the problem that may be attributable to SWP operations. To alleviate the remaining southern Delta problems, several alternative physical solutions have been proposed in the past. These include:

- ° Control structures, which would induce higher water levels and circulation.
- ° New distribution channels.
- ° Dredging existing channels.
- ° Extension of Tom Paine Slough to the San Joaquin River so that water could be pumped from Old River into the San Joaquin River to provide circulation.

No plan is now active for implementing any of these potential solutions. All, however, would be compatible with a Delta water transfer facility plan and could be integrated with such a plan.

The South Delta Water Agency has filed a suit against the U. S. Bureau of Reclamation and the Department of Water Resources alleging damage to the southern Delta because of the effects of the Central Valley Project and the State Water Project on water quality and water levels. Responsibility for alleviating these problems has not been determined.

North Delta Water Agency Contract. In January 1981, the Department of Water Resources signed a contract with North Delta Water Agency for a dependable water supply. The Agency represents agricultural water users in northern and western portions of the Delta.

The contract sets water quality standards to be met by the State Water Project and requires the Agency to pay for benefits arising from project operations. (The Bureau of Reclamation is not a party to this contract.) The standards are parallel to Decision 1485 standards, but at times are more stringent. The extra outflow required to meet these more stringent standards could reduce the critical period yield of the State Water Project by more than 100,000 acre-feet per year. The contract also provides that "the State may provide diversion and overland facilities to supply and distribute water to Sherman Island", and that "after the facilities are constructed and operating, the water quality criteria ... shall apply at the intake of the facilities."

The Department is bound to the contract regardless of future changes in Decision 1485 standards. However, due to differences between water quality standards in Decision 1485 and the North Delta Water Agency contract, it is appropriate to consider Sherman Island separately from other western Delta islands.

Preliminary plans for an overland system for Sherman Island show that it must deliver up to 6,500 acre-feet per month. The system would consist of:

- ° Diversion from Threemile Slough through automatically controlled siphons. If diversion at Threemile slough does not provide good enough water quality water, the point of diversion would be moved upstream to a point where contract quality could be maintained.
- ° Transport to the Main Canal through a new canal parallel to Highway 160.
- ° Conveyance and storage in the Main Canal and Mayberry Slough.
- ° Distribution through seven gravity laterals and five pump laterals.

Final design and specifications would be subject to approval of the North Delta Water Agency and of Reclamation District 341. The Agency or its transferee would assume ownership and full operation and maintenance responsibilities for such facilities after successful operation was demonstrated.

Estimated cost of the facilities is \$11 million. Building such facilities would prevent the possible loss of more than 100,000 acre-feet of yield to the State Water Project. This assumes that the contract criteria would be measured at the intake of the facilities and that there would be no change in Decision 1485 standards. The Department intends to build these facilities in the near future.

The requirements of the North Delta Water Agency contract are binding only on the Department of Water Resources, so any additional water needed to fulfill the contract above the requirements of Exhibit A of the proposed Coordinated Operation Agreement would be solely the Department's responsibility.

Contra Costa Canal Intake Relocation.

Over the past two decades, many proposals have been made for relocation of the intake of the Contra Costa Canal. Water quality at the present intake location, on Rock Slough, is subject to degradation by ocean salts advancing up the lower San Joaquin River during low-flow periods, and by local agricultural drainage during high-flow periods.

The value of relocating the intake depends on what, if any, Delta water transfer facilities may be constructed in the future. Most of the Delta transfer plans under consideration could eliminate reverse flows in the lower San Joaquin River, which would prevent intrusion of ocean salts in the Rock Slough area. With water quality at the present intake thus protected, relocating the intake would mainly serve to avoid adverse water quality effects attributable to the local drainage problem. Such local effects could be overcome by engineering means other than relocating the intake.

Additional Offstream Storage South of the Delta. One way to increase the water supply yields of the CVP and SWP involves increasing the projects' capacity to store water exported from the Delta. At present the projects can store significant amounts of export water only in the joint Federal-State San Luis Reservoir, near Los Banos. Storage capacity could be increased by building additional surface storage facilities or by using natural ground water basins for storage. Either way, the additional storage space is usable only if excess water is available in the Delta and the projects have conveyance capacity to transport this water to the place of storage.

The Department of Water Resources has investigated many possible sites for surface and subsurface offstream storage south of the Delta. (Offstream means not in the direct course from the collection of water, as in a watershed, to its delivery and use.) The surface

sites are all in the hills just above the western fringes of the San Joaquin Valley and near the California Aqueduct. The subsurface sites are in the southern San Joaquin Valley, Southern California and the southern San Francisco Bay area. The effectiveness of all the potential sites for offstream storage is limited by pumping capacity at the Delta, and in some cases by aqueduct capacity as well. Installation of additional pumps proposed for the SWP's Banks Pumping Plant would make all of the offstream storage proposals more feasible.

Recently, the Department has expressed interest in constructing the Los Banos Grandes offstream reservoir, which would be located about 3 miles south of the existing San Luis Reservoir. The new reservoir would be designed to store excess water that would otherwise flow to sea in winter. It would provide more flexibility in timing Delta diversions to meet the various seasonal needs of salmon, steelhead, and striped bass. The full effectiveness of Los Banos Grandes could not be realized without a Delta transfer facility and the proposed additional SWP export pumps.

Cottonwood Creek Project. The U. S. Army Corps of Engineers has proposed to construct two dams and reservoirs on separate forks of Cottonwood Creek, the largest remaining uncontrolled tributary of the Sacramento River. Under a contract with the Corps, the State Water Project would obtain water storage capability in these reservoirs worth an estimated 150,000 acre-feet in annual project yield.

The Cottonwood Creek project would give the State Water Project greater flexibility in storing water and making storage withdrawals. Potential environmental effects of the Cottonwood Creek project are reported in a Corps of Engineers document, "Cottonwood Creek, California; Draft General Design Memorandum; Phase I, Plan Formulation; Main Report, Part II, Environmental Impact Statement", dated June 1982.

State Purchase of Central Valley Project Yield. The Department of Water

Resources has expressed interest in negotiating a contract for purchase of Central Valley Project water to assist each project in making more efficient use of water supplies. This water can be recalled if needed by existing or new long-term CVP contractors.

Executing a purchase agreement would be a discretionary governmental action having potential for significant environmental impacts. Requirements of the National Environmental Policy Act and California Environmental Quality Act would, therefore, have to be satisfied before any such agreement were executed. Executing the draft Coordinated Operation Agreement is not a prerequisite.

Trinity River Fish Flows. In a 1980 study, the U. S. Fish and Wildlife Service evaluated eight alternative plans for flow releases from the CVP's Lewiston Dam into the Trinity River to improve fish habitat and production. The alternative releases considered ranged from 120,500 acre-feet per year (the minimum release level then in effect) to 340,000 acre-feet per year. At the conclusion of the study, the Fish and Wildlife Service recommended releasing 340,000 acre-feet in normal years, 220,000 in dry years, and 140,000 in critically dry years. Such releases would reduce CVP water supply yield by about 4 percent as compared to CVP yield with the original minimum release levels.

In 1981, the Secretary of the Interior approved the Fish and Wildlife Service's recommended releases for a 12-year experimental period. However, until a stream habitat management program is completed, maximum annual releases will be 286,700 acre-feet in normal years.

The 1980-level operation study used for Exhibit B-1 of the draft Coordinated Operation Agreement assumed the Trinity releases recommended by the Fish and Wildlife Service. The 2020-level

studies used the original 120,500 acre-foot minimum releases from Trinity.

Exhibit B-2 would have to be recalculated with a reduced CVP yield if the Fish and Wildlife Service's flow recommendations were adopted permanently.

Auburn Dam and Folsom South Canal.

These CVP components, both partly complete, involve further water development in the drainage of the American River. The Auburn Dam site is on the North Fork American River, near Auburn. It was planned as a 700-foot-high, thin-arch dam, impounding a 2.4 million acre-foot reservoir. Seismic safety concerns halted construction after extensive site preparation, but no actual dam building had started. The project will remain uncompleted until alternative plans are evaluated and Congress reauthorizes the project. The Bureau of Reclamation is seeking participation of non-Federal entities in financing the dam.

Folsom South Canal, with an initial diversion capacity of 3,500 cubic feet per second, originates at Lake Natoma, an afterbay of Folsom Dam, which is downstream from the Auburn Dam site. The first two reaches, about 27 miles, have been completed. The complete canal would be 69 miles long and serve industrial, municipal, and irrigation users in Sacramento and San Joaquin counties. About 17,000 acre-feet is now being delivered annually to the Rancho Seco Powerplant of the Sacramento Municipal Utility District.

If Auburn Dam and Folsom South Canal are completed, up to 590,000 acre-feet could be delivered annually in the Folsom South service area. If neither is completed, up to 350,000 acre-feet could be delivered annually through the two existing reaches of the canal. Water users might have to build their own facilities to transport water from the end of Reach 2 to the place of use.

Several of the alternatives being considered for completion of Auburn Dam

would involve meeting most or all of the requirements in State Water Resources Control Board Decision 1400. That decision specifies minimum flows in the American River for recreation and fish. These flows could be provided while still meeting needs of the Folsom South service area by operating a new pumping station on the Sacramento River that would pump water eastward via several new canals to a new reservoir, which would release water to Folsom South Canal.

The studies that produced Exhibits B-1 and B-2 of the Agreement did not assume completion of Auburn Dam or Folsom South Canal. Flows roughly equivalent to Decision 1400 requirements were maintained in the American River in the 1980-level study for Exhibit B-1. Much lower minimum flows, down to 250 cubic feet per second, were assumed for the 2020-level study that produced Exhibit B-2.

San Luis Unit. A Federal-State inter-agency team is identifying and evaluating alternative proposals to solve the problem of agricultural drainage in the San Joaquin Valley, including the San Luis Unit and Delta-Mendota Canal service areas. The recommended alternative may include amending the water service contract with Westlands Water District to increase the long-term commitment of water by 250,000 acre-feet from the San Luis Unit.

The completed San Luis Unit was included in the Coordinated Operation Agreement operation studies. At present, additional water is being delivered to the unit on a temporary basis. Amending contracts with the District would have no effect on the Agreement.

San Felipe Division. The San Felipe Division of the CVP will eventually serve parts of Santa Clara, San Benito, Santa Cruz, and Monterey counties. Facilities are under construction to convey water to Santa Clara County and the Hollister area of San Benito County.

These facilities are required to meet projected water demands, prevent further mining of the ground water in Santa Clara County, and replace boron-contaminated water and stop land subsidence in San Benito County. Santa Clara County would ultimately receive about 152,500 acre-feet annually, and San Benito County would receive about 43,800 acre-feet annually.

Water would be developed by existing facilities of the CVP and would be conveyed through State or Federal facilities to San Luis Reservoir. From the reservoir, the Pacheco Tunnel will convey water to a series of canals, pumping plants, and conduits to both counties. Existing reservoirs in the Santa Clara area and the planned San Justo Reservoir will store and control the water. The project is scheduled for completion in 1988. The San Felipe division was included in the studies for Exhibit B-2.

Cross Valley Canal. Kern County Water Agency's Cross Valley Canal is part of a delivery system used to supply CVP water from the Delta to agricultural users near to and north of Bakersfield. CVP water actually delivered to these customers is water from Millerton Lake, delivered through the Friant-Kern Canal, that would otherwise be delivered to the Arvin-Edison Water District, south of Bakersfield. By delivering Delta water to Arvin-Edison through the Cross Valley Canal, the Friant-Kern water is released for use north of Bakersfield.

Water for delivery through the Cross Valley Canal is captured in Federal reservoirs north of the Delta and delivered down the Sacramento River system for diversion from the Delta. However, the CVP's Delta-Mendota Canal is too small to carry the extra water from the Delta to O'Neill Forebay, and the San Luis Canal (the Federal-State segment of the California Aqueduct) ends at Kettleman City. The Cross Valley Canal intercepts the California Aqueduct 65.7 miles south of Kettleman City, at

Tupman. Therefore, the CVP water must be wheeled 63.4 miles through the California Aqueduct from the Banks Pumping Plant to O'Neill Forebay and 65.7 miles from Kettleman City to Tupman.

In 1977, a critically dry year, the Bureau of Reclamation wanted to make deliveries through the Cross Valley Canal from San Luis Reservoir during a period when the CVP was not operating in compliance with the then-current State Delta standards. The Department of Water Resources refused to wheel water for the Cross Valley Canal through State facilities. Since 1977, the CVP has been operated in compliance with State Delta standards, and wheeling for the Cross Valley Canal has not been curtailed. With the Proposed Action, CVP compliance with the Exhibit A Delta standards would be guaranteed.

A portion of the total CVP water supply in Exhibits B-1 and B-2 is allocated to the water users served by the Cross Valley Canal.

Mid-Valley Canal. Mid-Valley Canal, a proposed CVP facility that has not been authorized, was planned to convey about 500,000 acre-feet per year of Central Valley Project water to serve portions of Merced, Madera, Fresno, Kings, and Tulare counties and, by exchange, furnish water to Kern County. The project would alleviate part of the serious ground water overdraft in the area.

Water would have been conveyed from the Delta to near Mendota Pool by the Delta-Mendota Canal, enlarged in capacity by 2,000 cubic feet per second. At Mendota Pool, the water would be lifted into two new canals: a 110-mile Mid-Valley Canal for use in Fresno, Kings, and Tulare counties; and a 39-mile North Branch Canal for use in Madera and Merced counties.

The Mid-Valley Canal would not affect Exhibit B-1 or B-2 because it would only transport uncontracted water. However,

because it would be a new facility, construction of the Mid-Valley Canal would occasion a review of the Coordinated Operation Agreement.

Enlarged Shasta. In 1983, the Bureau of Reclamation and the Department of Water Resources began a study of feasibility of enlarging Shasta Lake. The enlargement has been proposed to increase water supplies for the Central Valley Project and State Water Project, increase power generation, improve fisheries and recreation, and provide additional flood control along the Sacramento River. The existing Shasta Lake can store a maximum of 4,552,000 acre-feet. Studies have considered various increases in the dam height, up to a maximum of 200 feet. A 200-foot increase would create about 9.5 million acre-feet of additional storage space at the lake. About 25 structural and nonstructural alternatives to enlarging Shasta have also been evaluated.

A joint status report on enlarged Shasta studies is scheduled for completion in 1985.

An enlarged Shasta would activate Article 14, "Periodic Review", and Article 16, "New Facilities", of the Coordinated Operation Agreement. The Agreement might have to be amended. New operation studies would be done to determine the increase in yield for both the SWP and the CVP.

Tehama-Colusa Canal. As now planned, the Tehama-Colusa Canal will extend 111 miles from the Red Bluff Diversion Dam to Yolo County. It will eventually supply 450,000 acre-feet of water annually. About 59.3 miles of the canal are in operation. The remaining reaches of the canal are nearly complete.

Exhibit B-2 covers the full deliveries of this canal.

San Joaquin Conveyance Study. The Bureau of Reclamation began the

San Joaquin Conveyance Study in 1982. The purpose of this study is to develop plans for facilities to import additional water to the San Joaquin Valley to relieve existing ground water overdrafts. The study area includes the entire San Joaquin Valley, mainly San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, Kings, and Kern counties. The study is a joint effort between the Bureau and the Mid-Valley Water Authority, which is made up of about 30 counties and water districts.

About 2 million to 2.5 million acre-feet of water per year is needed to replace supplies presently obtained from ground water overdrafts. Potential water resources in the Sacramento Valley are the most likely new sources of water, including the unfinished Auburn Reservoir, enlarged Shasta Lake, and several offstream alternatives to enlarged Shasta.

Several potential programs for delivering additional water to the San Joaquin Valley have been studied. The Mid-Valley Canal is one. An East Side Canal was analyzed in the 1960s as part of the Bureau of Reclamation's proposed East Side Division. The canal would have extended 334 miles from the American and Sacramento rivers to Bakersfield, and would have operated in conjunction with five new offstream reservoirs. The East Side Division plan was deferred. Other potential programs for the San Joaquin Valley include conjunctive use of surface water with ground water supplies (including artificial ground water recharge), new storage facilities, waste water reclamation, and water conservation.

No plan has yet been devised for the San Joaquin Valley Conveyance Study. However, the plan eventually selected will include water conservation and ground water management.

Relationship Between Short-Term Uses Of The Environment and Long-Term Productivity

No issues regarding the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity need arise in connection with the Proposed Action. The Proposed Action has to do with how existing long-term uses of the environment by the CVP and SWP will be coordinated. If the parties to the Proposed Action perceive at some time in the future that the Proposed Action is not in the interests of long-term productivity, the Proposed Action may be changed, invalidated, or abandoned. Residual effects in such a situation would be minimal and short-lived.

Adverse Environmental Effects That Cannot Be Avoided

The Proposed Action has to do with how the Central Valley Project and the State Water Project will be operated, but it would not constrain operations to such a degree that an adverse environmental impact resulting from the Proposed Action would be unavoidable. The same would be true for No Action.

If operation under the proposed Coordinated Operation Agreement is found to cause adverse environmental effects, operations can be adjusted within the scope of the Agreement or the Agreement can be changed. Adverse water temperature impacts of the Proposed Action, (see "Environmental Consequences, Rivers and Reservoirs") may be difficult to avoid in extremely dry years.

Irreversible or Irretrievable Commitments of Resources

Neither the Proposed Action nor its No Action alternative would involve irreversible or irretrievable commitments of

resources. The Proposed Action would commit quantities of water for the Sacramento-San Joaquin Delta and Suisun Marsh, but this commitment would not be irreversible. The water committed would not be irretrievable except in the time frame of as many hydrologic years as may be required to fill the reservoirs once they are drawn down.

The proposed Coordinated Operation Agreement includes, in Article 14, a procedure by which the Agreement may be changed and a procedure by which the parties could terminate the Agreement.

Urban Quality, Historic and Cultural Resources, and the Design of the Built Environment

The Proposed Action would have no effect on urban quality, historic, and cultural resources, or on the design of the built environment.

Case C of the No Action alternative, in which the State Water Project would lose some of its yield so as to assure meeting the Delta standards of Decision 1485, could adversely affect the built environment in urban areas that rely on the SWP.

Possible Conflicts With Governmental Plans

The Proposed Action would not conflict with any Federal, regional, State, or local land use plans.

The No Action alternative would conflict with the State Water Resources Control Board's Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh, which incorporates the Decision 1485 Delta standards.

Cumulative and Growth-Inducing Impacts

As long as no new project facilities are built, the Proposed Action would,

on an overall basis, provide added environmental protection. If new project facilities are built, they will have their own environmental documents. The general expected effects of possible future water planning actions are presented in Table 15.

In addition to SWP and CVP water planning actions, many factors have affected and will continue to affect the estuary cumulatively. Among these are:

- ° Land reclamation and bay fill.
- ° Sediment load from early gold mining activity.
- ° Toxic chemical, pesticide, and waste water pollution from cities, farms, and boaters.
- ° Concentrated salt loadings from irrigation and soil leaching agricultural activities.
- ° Commercial, sport, and illegal fishing.
- ° Construction and maintenance of ship channels.
- ° Use of natural inflows by upstream and Delta agricultural and urban development.
- ° Direct diversions and thermal pollution of power plant operations.
- ° Increased urbanization around the Bay-Delta area, resulting in loss of valuable wildlife habitat.
- ° Agricultural practices and crop patterns that decrease the value of the Delta to wildlife.
- ° Levee maintenance programs in which riprap replaces riparian habitat.
- ° Upstream storage and regulation of natural inflows by the Hetch Hetchy Aqueduct, Mokelumne Aqueduct project, Central Valley Project, State Water Project, and others.

Table 15
 EXPECTED ENVIRONMENTAL EFFECTS OF POSSIBLE FUTURE ACTIONS*

Effects	Action or Project							Water Conservation
	Wheeling & Purchase Agreement	New CVP Contracts No. of Delta	New CVP Contracts So. of Delta	Additional Reservoirs	New Offstream Storage	New SWP Pumps**	Delta Transfer Facility	
Delta Inflow	Increase during regulated flow	Annual reduction	Increase during regulated flow	Winter/spring reduction; summer/fall increase	No significant change	No significant change	Summer/fall reductions	Possible reduction of carriage water releases
Delta Export (Seasonal)	Depends on terms of agreement	No change	Summer/fall increase	Summer/fall increase	Winter/spring increase	Winter increase; slight summer decrease	Summer/fall increase	Exports minimized
Delta Export (Annual)	Increase	Decrease	Increase	Drier year increase	Wetter year increase; minimum change in drier years	About a 1% increase	Drier year increase	Exports minimized
Delta Outflow (Seasonal)	Depends on terms of agreement	Summer/fall decrease	Decrease	Winter/spring reductions	Winter/spring reductions; maximum summer/fall potential	Slight decrease in winter unregulated outflow	Summer/fall reductions	Potential carriage water reduction in summer/fall
Delta Outflow (Annual)	Increase in regulated out-flow w/purchase; decrease w/wheeling	Decrease	Decrease	Drier year increase	Wetter year reductions	Less than .5% decrease; all unregulated flow	Drier year reductions	Outflow maximized
Delta Fish	Screening losses increase if summer exports increase	Potential generalized impact from reduced flow	Increased screening losses	Increased screening losses	Operational flexibility to minimize screening losses	Decreased screening losses for most species; increase for others	Improved migration; potential screening loss reduction	Improved migration; potential screening loss reduction
Reservoir Operations	Increased drawdown; fish and recreation impacts	Increased drawdown; fish and recreation impacts	Increased drawdown; fish and recreation impacts	Existing reservoirs could maintain higher levels	Existing reservoirs could maintain higher levels	No significant change	Potential for increased drawdown	Potential to maintain higher reservoir levels
Riverflows	Increases in summer; possible effects on fish and water quality	Increases in summer; possible effects on fish and water quality	Increases in summer; possible effects on fish and water quality	Could change flow patterns, water quality and fish migration	No significant change	No significant change	Flow pattern changes; possible fish impacts, seepage, and bank erosion	Potential for more flexibility in flow patterns
Other Effects	Potential for new CVP contracts	Possible land use changes	Reduced ground water overdraft	Land inundated; fish/wildlife; cultural resources	Land inundated; fish/wildlife; cultural resources		New channels and/or dredging and expansion of existing channels	

* Only indicates probable trends or directions in environmental effects. Detailed analysis needed for each project.
 ** Under constrained operation.

- ° Delta diversions by the Central Valley Project, State Water Project, local Delta municipal and industrial water users, and Delta agricultural water users.
- ° Levee failures in the Delta.
- ° Wavewash erosion caused by boat traffic.

Wheeling Arrangements

Article 10(h) of the proposed Agreement commits the parties to begin negotiations toward a separate contract that would specify arrangements whereby excess capacity in the pumping and conveyance facilities of the SWP would be used to increase the amount of water the CVP can deliver from the Delta. This is a separate action, requiring a separate contract or agreement and a separate environmental impact report. With its present Delta export facilities, the CVP lacks the pumping and conveyance capacity to deliver to its existing and potential contractors south of the Delta all the potentially exportable CVP water available in the Delta at certain times. The SWP has capacity in the California Aqueduct for wheeling CVP supplies. With wheeling through SWP facilities, the effect of the CVP's capacity limitation would be lessened. However, the SWP's capacity at Banks Pumping Plant is only about 60 percent of the California Aqueduct's capacity, and additional pumps would have to be installed to allow a significant increase in wheeling for the CVP.

Wheeling of the type covered under Article 10(h) could represent increased export from the Delta. Such wheeling is distinguishable from other wheeling covered under Article 10 by the fact that the other wheeling, for outages and to make up for the May-June pumping restrictions of Exhibit A, is already established practice and serves only to maintain, and not expand, the water supply services of the SWP and CVP.

To the extent some wheeling arrangement negotiated pursuant to Article 10(h) could increase project exports from the Delta, the increase could cause environmental impacts incremental to those associated with the existing level of project operations. However, any future wheeling arrangement would have to be carried out within the protective flow and quality provisions of the State Water Resources Control Board's Delta standards and would require a separate EIR/EIS and contract.

Any incremental impacts of wheeling arrangements negotiated pursuant to Article 10(h) cannot be quantified or specifically described until the details of these arrangements are known. Early indications from operation studies suggest that the SWP's excess pumping and conveyance capacity available for wheeling with existing facilities and restrictions is small. The potential for wheeling would increase if SWP facilities were expanded.

Probable impacts of wheeling arranged pursuant to Article 10(h) are outlined in Table 15 as they relate to probable impacts of other future actions.

Further analysis of the environmental impacts of wheeling may be found in the following future documents:

- ° The environmental impact report on installation and operation of additional pumps proposed for the Banks Pumping Plant.
- ° The environmental statements being prepared by the U. S. Bureau of Reclamation concerning proposed water service contracts.
- ° The environmental documents the Department of Water Resources will prepare for a Delta water transfer facility.
- ° Any environmental document prepared in connection with new Delta standards that succeed those of Decision 1485.

° The environmental document that will be prepared for the agreement negotiated pursuant to Article 10(h), should that agreement be determined to have significant environmental effects.

Purchase of CVP Water by the SWP

The negotiations required by Article 10(h) would address not only wheeling, but also purchase of CVP water by the SWP. With its reservoirs in the Sacramento Valley basin and on the Trinity River, the CVP has developed water supplies in excess of its existing contractual demands and in excess of its present Delta export capabilities. This excess supply includes the water the CVP would seek to have wheeled under arrangements negotiated pursuant to Article 10(h), and it includes the water the SWP would seek to buy. An indication of the total amount of water that might be wheeled or bought may be taken from the line labeled "Incremental Supply" in Exhibit B-1 of the proposed Agreement, which gives an annual figure of 405,000 acre-feet.

The overall effect of a purchase of CVP water by the SWP would be to increase exports from the Delta. The effects of exports on the Delta were discussed in the preceding section, headed "Wheeling Arrangements". At least some of the increase in export would be sustained by increased drawdown at CVP reservoirs. Potential impacts of increased drawdown with the Proposed Action are discussed under "Environmental Consequences, Rivers and Reservoirs". No incremental impacts of water purchase can be quantified or specifically described until the water purchase arrangements resulting from the negotiation process pursuant to Article 10(h) are known. The water purchased by the SWP could probably be exported on a different schedule from that used to export water being wheeled for the CVP. Impacts would vary significantly according to the month in which project operations are changed.

In the State Water Project service areas, no significant environmental impacts would be expected as a result of any water purchases by the SWP from the CVP with existing facilities. This is because the amount of water that could be purchased would likely be relatively small and serve only to maintain, and not expand, existing agricultural and urban uses.

The probable impacts of water purchases such as may be arranged pursuant to Article 10(h) are outlined in Table 15 as they relate to the probable impacts of other future actions.

Potential environmental impacts of water purchases by the SWP from the CVP will be analyzed further when a wheeling and purchase contract has been negotiated.

Removal of the Moratorium on New Water Service Contracts

After the Coordinated Operation Agreement is signed, the Bureau of Reclamation plans to propose that the Secretary of the Interior lift a moratorium on the Bureau entering into additional long-term CVP water service contracts. The moratorium was administratively imposed by a previous Secretary of the Interior in 1979. The terms of the moratorium provided that it would be lifted when the responsibilities of the CVP toward water quality protection in the Delta had been clarified and the Bureau had committed itself to meet these responsibilities. The Delta water quality and outflow standards in Exhibit A of the proposed Agreement, plus the sharing formula contained therein, define the CVP's responsibilities toward Delta water quality protection. Signing the Agreement would commit the Bureau to meeting these responsibilities.

The proposed Agreement quantifies the water supply of the CVP and removes some uncertainty regarding how much of that supply remains uncommitted. The CVP now has water service commitments totaling 7.3 million acre-feet, and Exhibit B-2

of the proposed Agreement indicates that the CVP could supply as much as 8.3 million acre-feet through existing CVP facilities on a firm basis when "full development" is reached. Potential customers for the uncommitted 1.0 million acre-feet include the State Water Project and users in the Sacramento and San Joaquin valleys.

Environmental impacts of new CVP water service contracts would depend on the location of the contractor, the amount of water involved, the season of water delivery, and many other factors. Table 15 outlines the probable impacts of new CVP water service contracts north and south of the Delta as they relate to the probable impacts of other future actions. More detailed environmental analysis of such impacts will be done when specific contracts are being considered. Such analyses will include fish and wildlife, endangered species, cultural resources, recreation, prime agricultural lands, floodplain management and wetland protection, socio-economic, drainage, subsidence and land-use changes. The Bureau has scheduled and budgeted environmental reviews for future water marketing activities in the following service areas:

- The Sacramento service area, which provides water to Tehama-Colusa and Corning service areas. Tehama-Colusa service area, on the west side of the Sacramento River, extends from the middle of Tehama County to northern Yolo County. Of about 205,000 irrigable acres in the service area, 59,921 were irrigated in 1983. The Corning service area is in Tehama County, west of the Tehama-Colusa service area. Of about 38,423 irrigable acres in the service area, 11,014 were irrigated in 1983.
- The Delta Division, which is in the northern half of San Joaquin Valley along the San Joaquin River and west of it from Alameda and San Joaquin counties south to Fresno County. Of

about 235,000 irrigable acres in the service area, 190,244 were irrigated in 1983. Municipal and industrial (M&I) uses in the Delta Division include about 78,000 acre-feet per year of water. Over 190,000 people are served, mainly in Contra Costa County. About 14,800 acre-feet of water is supplied annually for waterfowl management and gun clubs.

- The West San Joaquin Division, which is in the western portion of Fresno, Kings, and Merced counties. Of about 633,000 irrigable acres in the service area, 492,322 were irrigated in 1983. About 11,600 acre-feet per year of water was delivered for M&I uses, serving about 24,500 people.
- The American River Division, which is in Sacramento and eastern San Joaquin counties. There are about 416,000 irrigable acres in the unit. Water could be delivered if Auburn Dam were completed. The Folsom Unit, in Sacramento, Placer, and El Dorado counties, mainly serves water for M&I use. Of about 29,500 irrigable acres, 2,606 were irrigated in 1983. About 52,225 acre-feet per year of water was delivered for M&I use in 1983, serving about 284,240 people. By 2020, about 135,000 acre-feet of water would be required annually for M&I uses.
- The Shasta Division, which is in Shasta and northern Tehama counties. Of about 449,000 irrigable acres in the service area, 254,360 were irrigated in 1983. About 4,994 acre-feet of water is delivered annually for M&I uses, serving about 59,515 people.
- The Friant Division, which serves Fresno, Tulare, and Kern counties. Of about 928,000 irrigable acres in the service area, 695,113 were irrigated in 1983. Madera Canal serves Madera County. Of about 161,000 irrigable acres in the service area, 131,931 were irrigated in 1983; 18,430 acre-feet of water is delivered annually for M&I uses, serving 229,459 people.

° The Mid-Valley Canal service area, which is in the east side of the San Joaquin Valley from Merced County to Tulare and Kings counties. It has about three million irrigable acres planning for a Mid-Valley Canal to serve this area ended in 1979 because the water supply was no longer available. The Mid-Valley area has been integrated into a larger study, the San Joaquin Conveyance Study. The service area for this study would include the east side of San Joaquin Valley from San Joaquin County to Kern County.

Probable impacts of new CVP water service contracts as they relate to probable impacts of other future actions are outlined in Table 15.

Mitigation Measures for Cumulative Impacts

Various actions such as Decision 1485, Suisun Marsh facilities, and Department of Fish and Game stocking programs have benefited fish and wildlife in the Delta. Studies by State, Federal, and private groups have provided much information from which laws protecting fish and wildlife have been enacted. Today at least 30 State and Federal policies, as well as agency regulations, help protect the Delta's environment. Physical facilities such as fish screens at CVP and SWP pumping plants have been relatively effective in salvaging fish from export water. Funds for protection of fish and wildlife resources from State, Federal, and local sources have exceeded \$87 million for ecological studies and physical facilities.

Mitigation measures for cumulative impacts due to future State, Federal, and local water development generally consist of:

- ° Safeguards by laws, regulations, and water rights standards.
- ° Contracts.

- ° Physical measures.
- ° Studies and water management programs.

Safeguards

State and Federal laws that provide safeguards include:

- ° Area of Origin Law
- ° County of Origin Law
- ° Davis-Dolwig Act
- ° Delta Protection Act
- ° Burns-Porter Act
- ° Porter Cologne Act
- ° California Environmental Quality Act
- ° National Environmental Policy Act
- ° National Fish and Wildlife Coordination Act
- ° National Clean Water Act
- ° Provisions in Congressional Authorization of Federal Water Projects

State and Federal regulatory agencies administering the laws include the State Water Resources Control Board, Regional Water Quality Control Boards, Environmental Protection Agency, and U. S. Army Corps of Engineers.

Contracts

Binding contracts are negotiated between project operators and various interests. The Department of Water Resources has executed contracts with several Delta water agencies that commit the Department to provide reliable water supplies and qualities under the Delta Protection Act. These contracts provide a further safeguard for Delta protection. The Department is continuing negotiations with other Delta interests.

Contracts for management of fish and wildlife resources in the Bay and Delta estuary can be broadened as to scope and the participating agencies. Such contracts would specify mitigation measures identified by studies and negotiations.

The proposed agreement for coordinated operation of the State Water Project and the Central Valley Project would allocate available supplies and shortages between the projects after meeting in-basin obligations, including Delta water quality objectives.

Physical Measures

Potential physical mitigation measures for identified significant impacts are listed below. Specific measures could be incorporated in contracts.

- ° Fish -- Hatchery construction, adjustment of reservoir releases, habitat modification, establishment of reservoir fishery, fish screens and return systems, export curtailments, and fish stocking programs.
- ° Wildlife -- Purchase of replacement lands, capture and removal of species, control fencing, escape devices; mitigation in Suisun Marsh as specified in the Environmental Impact Report and Plan of Protection.
- ° Socioeconomic -- Payment of increased public services caused by project workforce.
- ° Cultural -- Avoidance or removal of identified cultural resources where possible; purchase of private property where necessary.
- ° Recreation -- Construction of recreational facilities.
- ° Soils and Vegetation -- Reestablishment of native vegetation, erosion control techniques, replacement of soil and topography where possible.

- ° Transportation -- Relocation of roads and railroads.
- ° Utilities -- Relocation of utilities.

Studies and Water Management Program

Many of the specific needs for mitigation are uncertain. Potential impacts requiring mitigation can be identified during studies. Objectives of the Interagency Ecological Study Program for the Sacramento-San Joaquin Estuary, funded in part by the State Water Project, are to:

- ° Improve understanding of the requirements of fish and wildlife in the estuary.
- ° Develop design and operating criteria for the State Water Project and Central Valley Project for protection and enhancement of fish and wildlife.
- ° Monitor and evaluate project operations.

These studies provide a sound basis for mitigation measures. For example, the predation control studies in Clifton Court Forebay may reduce losses of chinook salmon.

The court decision requiring monitoring of Delta channels with the additional pumps also provides mitigation. Mitigation for Delta agricultural needs will be identified through studies of the salt tolerance of corn. Continuation of programs to improve water management would provide mitigation by reducing the buildup rate of future upstream diversions and Delta exports.

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Appendix A

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE
DEPARTMENT OF WATER RESOURCES OF THE STATE OF CALIFORNIA
FOR COORDINATED OPERATION OF THE CENTRAL VALLEY PROJECT
AND THE STATE WATER PROJECT, USBR/DWR DRAFT

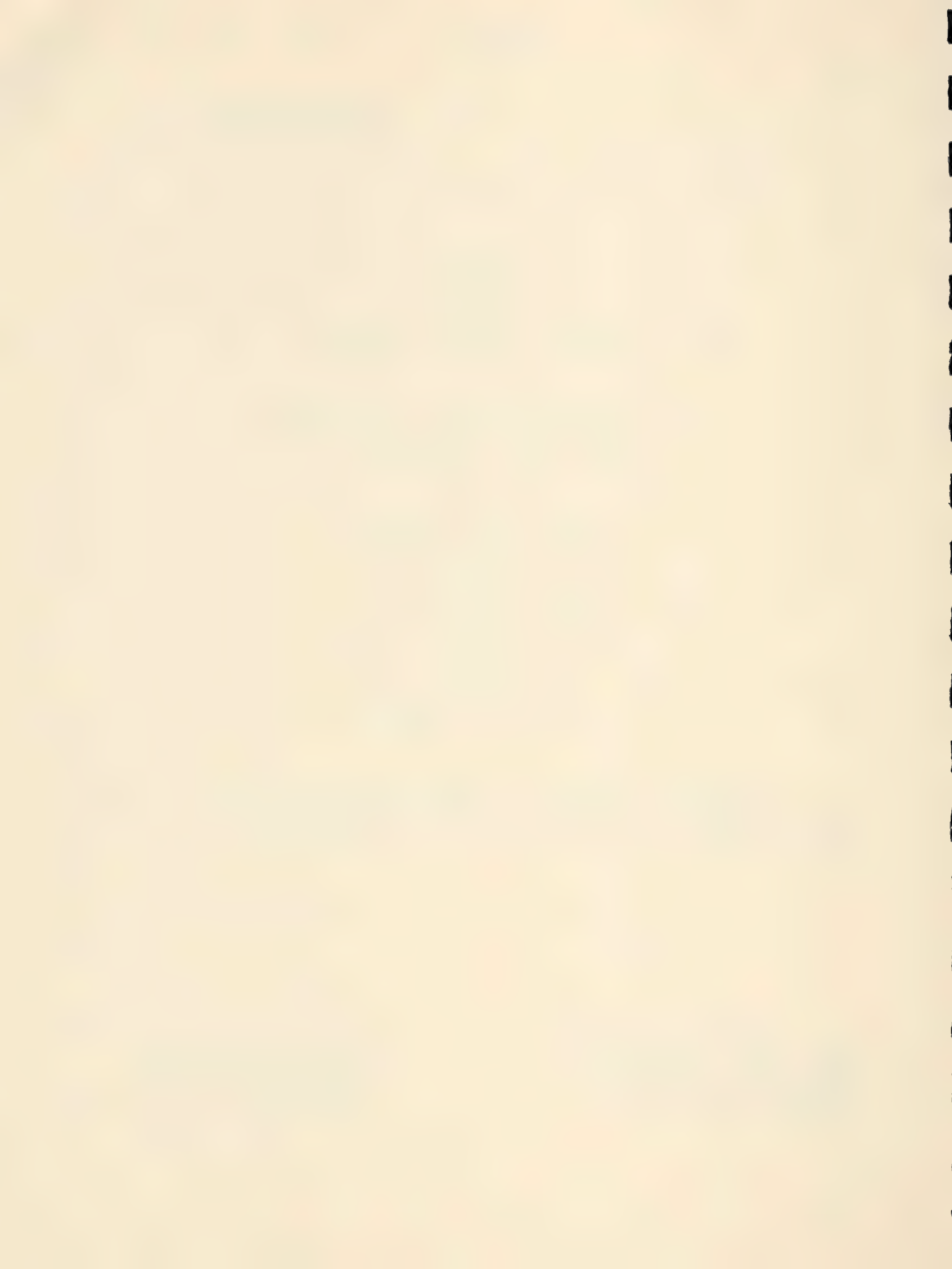


AGREEMENT
BETWEEN
THE UNITED STATES OF AMERICA
AND
THE DEPARTMENT OF WATER RESOURCES OF
THE STATE OF CALIFORNIA
FOR
COORDINATED OPERATION
OF THE
CENTRAL VALLEY PROJECT
AND THE
STATE WATER PROJECT

(This coordination agreement suspends the agreement of May 16, 1960, between the United States and the State of California.)

United States of America
Department of the Interior
Bureau of Reclamation
Central Valley Project
California

State of California
The Resources Agency
Department of Water
Resources
State Water Project



AGREEMENT BETWEEN
 THE UNITED STATES OF AMERICA
 AND
 THE DEPARTMENT OF WATER RESOURCES OF
 THE STATE OF CALIFORNIA
 FOR COORDINATED OPERATION OF THE
 CENTRAL VALLEY PROJECT AND THE STATE WATER PROJECT

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AGREEMENT BETWEEN
THE UNITED STATES OF AMERICA
AND
THE DEPARTMENT OF WATER RESOURCES OF
THE STATE OF CALIFORNIA
FOR COORDINATED OPERATION OF THE
CENTRAL VALLEY PROJECT AND THE STATE WATER PROJECT

1. THIS AGREEMENT, made the _____ day of _____, 198__, pursuant to the Act of Congress approved _____, P.L. _____, and pursuant to the California Central Valley Project Act, which is Part 3, Division 6 (commencing at Section 11100) of the California Water Code, and the California Water Resources Development Bond Act, Chapter 8, Part 6, Division 6 (commencing at Section 12930) of the California Water Code, between THE UNITED STATES OF AMERICA, herein called the United States, acting through the Bureau of Reclamation, Department of the Interior, represented by the contracting officer executing this agreement, and THE DEPARTMENT OF WATER RESOURCES OF THE STATE OF CALIFORNIA, herein called the State, represented by the director of Water Resources.

EXPLANATORY RECITALS

2. The United States has under construction and is operating the Central Valley Project, California, for the

development, conservation, control, and utilization of water resources in California.

The State has under construction and is operating initial facilities of the State Water Resources Development System, herein called the State Water Project, for the development, conservation, control, and utilization of water resources in California.

The United States and the State entered into an agreement on May 16, 1960, Article 16 of which recognizes the need for criteria for the coordinated operation of the Central Valley Project and the State Water Project.

Certain basic assumptions of that agreement require modification in light of subsequent developments and changes in the two projects.

The United States and the State had prepared a May 13, 1971, Draft Agreement which would have supplemented the Agreement of May 16, 1960.

The United States and the State have in the past been operating under annual letter agreements implementing the May 13, 1971, Draft Agreement.

The United States and the State by entering into this agreement will suspend the Agreement of May 16, 1960; but it is recognized that the legal positions of the parties regarding any interpretation of the terms of said agreement are preserved.

The United States and the State will observe reservoir operational criteria prescribed by the United States Corps of Engineers to minimize flood hazards.

The United States and the State each plans to meet all requirements and objectives of its project and to coordinate the operation of their projects so as not to adversely affect the rights of other parties and to conserve water.

The State and the United States intend to build additional water storage and transportation facilities.

Both the United States and the State have, pursuant to applications filed with the State Water Resources Control Board (formerly State Water Rights Board), received permits for appropriation of unappropriated water in furtherance of their respective projects.

It is in the best interest of the United States and the State to agree on the use of water rights as set forth in this agreement rather than litigate such uses as between the two projects and potentially all other water users in the Central Valley of California.

Both the State and the United States are dedicated to utilizing their existing and future water conservation

facilities so as to provide the maximum benefits to the people of California and the Nation and believe that through the coordinated and cooperative operation of State and Federal facilities, these benefits can be maximized.

NOW, THEREFORE, it is agreed:

DEFINITIONS

3. When used in this agreement, the following shall have the meanings hereinafter set forth:

(a) "Sacramento Valley inbasin uses" are legal uses of water in the Sacramento Basin including the water required under the provisions of Exhibit A.

(b) "Balanced water conditions" are periods when it is agreed that releases from upstream reservoirs plus unregulated flow approximately equal the water supply needed to meet Sacramento Valley inbasin uses, plus exports.

(c) "Excess water conditions" are periods when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley inbasin uses, plus exports.

(d) "United States storage withdrawal" is the sum of "Whiskeytown storage withdrawal" which is the positive daily mean flow computed by subtracting the daily mean local inflow to Whiskeytown Lake (total inflow excluding the flow through the Judge Francis Carr Powerplant) from the sum of the daily mean diversions from (i) Whiskeytown Lake to Spring Creek Powerplant, (ii) the Whiskeytown Dam releases to Clear

Creek, and (iii) measured water deliveries from Whiskeytown Lake; and the positive sum of:

(1) "Shasta storage withdrawal" which is the daily mean flow computed by subtracting the sum of (i) the daily mean inflow into Shasta Lake and (ii) the daily mean discharge from Spring Creek Powerplant from the sum of (i) the Keswick Dam releases to the Sacramento River and (ii) measured water deliveries from Shasta and Keswick Lakes; and

(2) "Folsom storage withdrawal" which is the daily mean flow computed by subtracting the daily mean inflow into Folsom Lake from the sum of (i) Nimbus Dam releases to the American River, (ii) Nimbus Dam diversions to Folsom South Canal, and (iii) measured water deliveries from Folsom Lake and Nimbus Lake.

(e) "State storage withdrawal" is the value calculated in 3(e)(1) except when specifically declared by the State that Upper Feather storage withdrawals are being made in which case "State storage withdrawal" is the sum of 3(e)(1) and (2).

(1) "Oroville Complex storage withdrawal" is the positive daily mean flow computed by subtracting the sum of the daily mean inflow into Lake Oroville and the daily mean discharge from Kelly Ridge Powerplant from the sum of the daily mean diversions at or into the following facilities:

Palermo Canal, Thermalito Diversion Dam to Feather River, Thermalito Diversion Dam to Hatchery, Diversion Structures for Butte County, Thermalito Irrigation District Diversion Structure, Richvale Canal, Western Canal, Pacific Gas and Electric Company's Lateral, Sutter Butte Canal, and the Thermalito Afterbay Outlet to Feather River.

(2) "Upper Feather River storage withdrawal" is the positive daily mean flow computed by subtracting the sum of the daily mean flow into Lake Davis and Antelope Reservoir from the sum of the daily mean releases from these reservoirs.

(f) "Export" means diversions by the United States and the State through export facilities specified in subarticle 5(b).

(g) "United States stored water" is the net increase in daily storage in Shasta Lake and Folsom Lake.

(h) "State stored water" is the net increase in daily storage in Lake Oroville and, when declared by the State, the net increase in daily storage in the Upper Feather River reservoirs.

(i) "Delta" means the Sacramento-San Joaquin Delta as described in California Water Code §12220 (Stats. 1959, C. 1766, p. 4249, § 1).

(j) "New Delta standards" are any Delta standards different from those set forth in Exhibit A.

TERM OF AGREEMENT

4. This agreement shall remain in full force and effect until terminated either by the mutual consent of the parties or as provided in subarticles 10(h), or 14(b).

FACILITIES

5. This agreement recognizes the following facilities as presently existing:

(a) Reservoirs:

<u>United States</u>	<u>State</u>
Shasta Lake	Lake Oroville
Keswick Reservoir	Thermalito Forebay
Clair Engle Lake	Thermalito Afterbay
Lewiston Lake	Thermalito Diversion Dam Reservoir
Whiskeytown Lake	San Luis Reservoir (Joint)
Folsom Lake	O'Neill Forebay (Joint)
Lake Natoma	Lake Davis
San Luis Reservoir (Joint)	Antelope Lake
O'Neill Forebay (Joint)	Lake Del Valle Pyramid Lake Castaic Lake Silverwood Lake Lake Perris
Millerton Lake	
New Melones	

(b) Export facilities:

<u>United States</u>	<u>State</u>
Contra Costa Pumping Plant #1	Harvey O. Banks Delta Pumping Plant, including Clifton Court Forebay
Tracy Pumping Plant	

COORDINATION OF OPERATIONS

6. (a) This agreement was negotiated on the basis of annual supplies reflected in Exhibit B. It is agreed that:

(1) The computations described in this article shall be the basis upon which the United States and the State shall coordinate the operations of the Central Valley Project and the State Water Project facilities specified in Article 5 in order to meet Sacramento Valley inbasin uses and maintain the respective annual water supplies specified in Exhibit B-1, or as that exhibit is revised in accordance with subarticle 6(a)(3).

(2) Nothing in this agreement shall constrain either party from moving toward full utilization of its facilities at any time.

(3) As either party proceeds toward the full utilization of its project, any changes in the underlying assumptions with respect to the development of the two projects and the demands for water from each project will be reflected by recomputing the annual water supplies specified

in Exhibits B-1 and B-2 in accordance with the provisions of subarticle 14(a). The methodology described in the document entitled "Technical Report on Determination of Annual Water Supplies for Central Valley Project and State Water Project," dated March 1984 will be used to recompute the annual water supplies and to revise, if necessary, the factors and procedures contained in this article.

(b) Determination of Sacramento Valley Inbasin

Use of Storage Withdrawals and Unstored Water for Export:

During period of balanced water conditions, daily computation shall be made to determine the difference between (i) the sum of the United States and State storage withdrawals adjusted for time of travel to the export facilities specified in subarticle 5(b), and (ii) the sum of the United States and State exports. If total storage withdrawals exceed total exports, the difference represents Sacramento Valley inbasin use of storage withdrawals. If total exports exceed storage withdrawals, the difference represents unstored water for export.

(c) Sharing of Responsibility for Meeting Sacramento

Valley Inbasin use With Storage Withdrawals During Balanced Water Conditions: Each party's responsibility for making available storage withdrawals to meet Sacramento Valley

inbasin use of storage withdrawals shall be determined by multiplying the total Sacramento Valley inbasin use of storage withdrawals by the following percentages:

<u>United States</u>	<u>State</u>
75	25

(d) Sharing of Responsibility During Balanced Water Conditions When Unstored Water for Export is Available:
Each party's responsibility to meet Sacramento Valley inbasin use and exports shall be determined by:

(1) Allocating the sum of United States stored water, State stored water and the unstored water for export by the following percentages:

<u>United States</u>	<u>State</u>
55	45

(2) If the daily sum of United States stored water and unstored water for export is greater than the United States share as allocated in 6(d)(1), then the United States is obligated, except when either subarticle 6(h) or 6(i) is in effect, to provide water to the extent that its daily sum is greater than its allocated share.

(3) If the daily sum of United States stored water and the unstored water for export is less than its share as allocated in 6(d)(1) then the State is obligated, except when either subarticle 6(h) or 6(i) is in effect, to

provide water to the extent that the State's daily sum of State stored water and unstored water used for export is greater than its allocated share.

(e) Accounting of Accumulated Responsibilities:

During balanced conditions, except when either sub-article 6(h) or 6(i) is in effect, the daily obligation as defined in subarticle 6(c) or 6(d) shall be accumulated. The accumulation in effect when balanced conditions end shall remain in force and resume when balanced conditions are again declared. At the request of either party, the accumulation will be reduced or eliminated within a reasonable time.

Otherwise, the accumulation shall continue until the agency that has the positive accumulation (has released more water than its defined responsibility) goes into a flood control operation. A flood control operation occurs when the actual storage exceeds the defined flood control permissible storage at Oroville Reservoir for the State or Shasta Reservoir for the United States. The flood control operation at Folsom Reservoir will not affect this provision because of its limited conservation storage.

(f) Changes in Sacramento Valley Inbasin Use

During Balanced Conditions: If the Sacramento Valley inbasin use changes, upstream reservoir releases and/or exports will be modified based on the current accumulation identified in subarticle 6(e) and/or the daily share of responsibility computed in subarticles 6(c) and 6(d).

(g) Responsibilities During Excess Water

Conditions: During excess water conditions each party has the responsibility to export and store as much water as possible within its physical and contractual limits.

(h) Availability of Storage Withdrawals to the Other Party: Unless otherwise agreed, whenever a party's storage withdrawal available for export is greater than its export capability, the difference shall be available for export by the other party without affecting either party's future responsibility for providing storage withdrawals to meet Sacramento Valley inbasin use.

(i) Availability of Unstored Water for Export to the Other Party: Unless otherwise agreed, whenever a party's share of unstored water for export exceeds its exports, the unusable portion is available for export by the other party without affecting either party's daily sum of stored water.

FORECASTING

7. Upon request, each party shall prepare and furnish to the other a forecast of its proposed operation related to the facilities specified in Article 5. The forecast shall indicate the flow available for export, storage withdrawals, and Sacramento Valley inbasin use. The forecasts shall be prepared and exchanged so as to allow sufficient time for the preparation of consolidated forecasts.

WATER MEASUREMENT RESPONSIBILITIES

8. The United States and the State, each at its own expense, shall install and maintain measuring and recording devices at its facilities specified in Article 5.

(a) Each party shall measure or compute and record daily, or at such other intervals as may be agreed upon, and provide to the other party the rates and quantities of water that will show the (1) estimated inflow to its reservoirs, (2) net releases from its reservoirs, (3) stage and change in storage of its reservoirs, (4) net amount of evaporation at its reservoirs, (5) diversions through its export facilities, and (6) its storage withdrawals.

(b) The measuring and recording devices shall be examined, tested, and serviced regularly to assure their accuracy. At any reasonable time either party may inspect the measuring and recording devices of the other party. Immediate action shall be taken to correct any deficiencies noted in such inspections. Accuracy in measurements of export diversions and releases from reservoirs shall be within commonly accepted engineering standards. All computations and correlations shall be calculated in a manner acceptable to both parties.

REDUCTION IN UNITED STATES AND STATE EXPORTS

9. If any forecast indicates that either the United States or the State, or both, will be unable to meet the anticipated demands of its water users during the balance of

the calendar year, representatives of the United States and the State shall confer on possible procedures for making joint operational changes to minimize the shortage. If agreement cannot be reached on a joint procedure for minimizing the threatened shortage, the United States and the State each shall be entitled to export the amount of water available to it according to calculations made pursuant to Article 6, and each party shall assess against its users such reductions as it deems necessary or appropriate.

EXCHANGES, CONVEYANCE, AND PURCHASES OF WATER SUPPLY

10. (a) Either party may make use of its facilities available to the other party for pumping and conveyance of water by written agreement.

(b) To the extent that operational constraints are imposed on the Central Valley Project by Exhibit A to minimize diversions of young striped bass from the Delta during May and June, which reduce Central Valley Project exports, the State will transport up to 195,000 acre-feet of Central Valley Project water through the California Aqueduct Reaches 1, 2A, and 2B no later than April 30 of the following year by direct diversion or by rediversion of stored Central Valley Project water at times that diversions do not reduce State Water Project yield.

The State agrees to transport this water subject to the following:

(1) The United States will supply power according to Exhibit D;

(2) During critical water supply years, as defined by D-1485, the State shall pump the water during Central Valley Project off-peak hours (10:01 p.m. to 6:59 a.m. Monday through Saturday and all day Sunday and national holidays);

(3) In all other water supply years, to the extent possible as determined by the State, pumping of this water shall be provided during Central Valley Project off-peak hours;

(4) The United States shall reimburse the State for incremental costs for pumping Central Valley Project water through the facilities specified in this subarticle. Incremental costs are those costs which if not reimbursed by the United States would otherwise cause increased charges to State Water Project water contractors over what they would have been charged if the State had not conveyed Central Valley Project water pursuant to this agreement, provided that the United States shall not be responsible for payment for any additional power demand charges that may result from pumping Central Valley Project water pursuant to subarticle 10(b). At present, the only incremental costs identified by the State are the replacement portions of the minimum and variable components of both the Delta Water Charge and Transportation Charge, as defined in

the November 4, 1960, State Water Supply Contract with The Metropolitan Water District of Southern California, as it now exists and may hereafter be amended. Incremental costs in 1985 amounted to \$0.21 per acre-foot of water conveyed.

(c) The State agrees to give priority to the United States to convey Central Valley Project water for scheduled or unscheduled maintenance and unforeseen outages of the Central Valley Project, from the Delta to O'Neill Forebay, not covered in subarticles 10(b) and 10(d), through the California Aqueduct Reaches 1, 2A, and 2B facilities at times that such conveyance does not reduce use of the State's facilities for the benefit of the State's long-term water supply contractors subject to the following:

(1) The United States will supply the power required to pump Central Valley Project water through the Harvey O. Banks Delta Pumping Plant;

(2) The State will be reimbursed for each of the following charges expressed as a unit rate and applied to each acre-foot of water conveyed. These charges will equal the sum of the components of the water charges for California Aqueduct Reaches 1, 2A, and 2B as defined in the State Water Supply Contract with the Metropolitan Water District of Southern California, dated November 4, 1960, as it now exists and may hereafter be amended.

(i) The capital component of the transportation charge.

(ii) The minimum component of the transportation charge.

(iii) The replacement portion of the variable component of the transportation charge.

(iv) The capital component of the Delta water charge.

(v) The minimum component of the Delta water charge.

These charges for 1985 total \$8.44 per acre-foot of water conveyed.

(d) In consideration for the conveyance of State Water Project water for scheduled or unscheduled maintenance and unforeseen outages from the Delta to O'Neill Forebay through Central Valley Project facilities, the State will convey for the United States an equal quantity of Central Valley Project water measured in acre-feet through its facilities at no charge; Provided, that such conveyance of Central Valley Project water shall be accomplished, if possible, within 12 months from the date conveyance of State Water Project water was completed. Each agency shall be responsible for supplying the power required to pump its water.

(e) The State, in an annual letter to the United States, will transmit the charges referred to in subarticles 10(b)(2) and 10(c)(2) above based upon the cost components listed therein.

(f) The State will submit invoices to the United States on or before June 30 of the year following the year in which the wheeling occurs. The United States will make payment within 30 days after receipt of such invoice.

(g) Prior to December 31 of the fifth full year following the execution of this agreement, the parties will agree upon the amount and value of the services each project has provided to the other project prior to the execution of this agreement and will agree upon the manner in which any imbalance is to be resolved. This subarticle shall not apply to services provided under a separate written agreement.

(h) (1) The parties shall promptly commence negotiating a contract for the conveyance and purchase of Central Valley Project water to assist each party in making more efficient use of the water project facilities and water supplies contemplated in this agreement. The terms and conditions of said contract shall be no less favorable to either party than the terms and conditions either party would make available to their respective long-term contractors, except as specified by this subarticle.

(2) The contract referred to in subarticle 10(h)(1) shall provide for, among other things, the sale of Central Valley Project water to the State for use by State Water Project contractors on the following conditions:

(i) When the Central Valley Project water sold to the State is needed by existing or new long-term Central Valley Project contractors, it shall be recalled by the United States for such contractors;

(ii) The United States shall impose deficiencies on water purchased by the State in a manner consistent with Exhibit E.

(3) The contract referred to in subarticle 10(h)(1) shall further provide for, among other things, the United States purchase of State Water Project conveyance service for transport of Central Valley Project water to Central Valley Project contractors on the following conditions:

(i) The State shall transport Central Valley Project water for the United States up to the amount of Central Valley Project water made available to the State for purchase each year on the same priority as water transported for State Water Project long-term contractors;

(ii) In addition, the United States shall have the first right to purchase all conveyance services that are in excess of the services being used to transport water

developed or purchased by the State or the State Water Project contractors. The conveyance of Central Valley Project water shall not diminish deliveries or increase costs of water supplies developed or purchased by the State or the State Water Project contractors.

(4) The parties recognize that to fully implement this agreement, the parties may be required to seek amendments to existing water rights permits or additional water rights permits for, (i) an additional point of diversion and rediversion at the State's Harvey O. Banks Delta Pumping Plant and the United States Tracy Pumping Plant; and (ii) consolidation and expansion of place of use. The State shall support the petition of the United States.

(5) At any time after December 31, 1988, if either party shall not have received all of the amendments or permits described in subarticle 10(h)(4) and which contain conditions satisfactory to that party, then that party may terminate this agreement on 180 days written notice, or utilize the provisions of subarticle 14(b)(2) to seek a resolution of its concerns.

DELTA STANDARDS

11. (a) The Central Valley Project and the State Water Project will be operated in conformity with the Delta standards in Exhibit A. Should the State Water Resources

Control Board establish new Delta standards, and the United States determines that operation of the Central Valley Project in conformity with the new Delta standards is not inconsistent with Congressional directives the parties shall amend Exhibit A to conform with the new Delta standards and amend this agreement to the extent necessary to provide for continued operation of both projects to accomplish the purposes of this agreement.

(b) Should the United States determine that the new Delta standards are inconsistent with Congressional directives then the United States shall promptly request the Department of Justice to bring an action for the purpose of determining the applicability of the new Delta standards to the Central Valley Project.

(c) The United States reserves the right to seek, at any time, the enactment of legislation regarding the operation of the Central Valley Project, including compliance with new Delta standards, which may supersede any final court decisions addressed in subarticle 11(b).

(d) The parties do not intend by this agreement to confer any additional authority upon either the Secretary of the Interior or the State Water Resources Control Board beyond that derived from applicable statutory and decisional law.

MONITORING

12. (a) The United States and the State recognize that certain monitoring activities must be done to ensure compliance with the Delta standards specified in Exhibit A. The necessary monitoring activities are specified in Exhibit C. The United States and the State agree to share equally the cost of those monitoring activities, including the analysis of the collected data.

(b) Exhibit C will be amended, if necessary, to ensure compliance with any Delta standards different from those set forth in Exhibit A which are applicable to the United States pursuant to Article 11.

(c) The parties agree that additional data must be collected and processed to determine the effects of the projects on the Delta and San Francisco Bay. Monitoring in addition to that specified in Exhibit C and the performance of Delta water quality studies will be covered by separate agreements.

RECORDS

13. Subject to applicable laws and regulations, the United States and the State shall have full access at all reasonable times to the books and records of the other party insofar as they pertain to this agreement, with the right to make copies thereof.

PERIODIC REVIEW

14. (a) Prior to December 31 of the fifth full year following execution of this agreement, and before December 31 of each fifth year thereafter, or more frequently if so requested by either party, the United States and the State jointly shall review the operations of both projects. The parties shall (1) compare the relative success which each party has had in meeting its objectives, (2) review operation studies supporting this agreement, including, but not limited to, the assumptions contained therein, and (3) assess the influence of the factors and procedures of Article 6 in meeting each party's future objectives. The parties shall agree upon revisions, if any, of the factors and procedures in Article 6, Exhibits B and D, and the Operation Study used to develop Exhibit B.

(b) (1) If the parties fail to enter into the contract referred to in subarticle 10(h)(1) by December 31, 1988, either party may give written Notice of Negotiation to the other party. Within 30 days of such notice, each party shall designate one member of an Advisory Board to which that problem shall be referred. The members designated by the parties shall choose a third member who shall act as chairperson. The Board shall report its unanimous recommendation to both parties with respect to all terms and conditions to be

included in said contract at a date not later than 12 months from the date of the Notice of Negotiation. The parties shall immediately implement that recommendation. If the Board fails to make a unanimous recommendation within the 12-month period, either party may unilaterally terminate this agreement.

(2) If the parties are unable to agree on changes to this agreement, or either party fails to receive all of the amendments or permits described in Article 10(h)(4), either party may give written Notice of Negotiation. If agreement satisfactory to both parties has not been reached within 12 months of such Notice, each party shall designate within 30 days one member of an Advisory Board to which the problem shall be referred. The members designated by the parties shall choose a third member who shall act as chairperson. The Board shall report its unanimous recommendations to both parties at a date not later than 24 months from the date of the Notice of Negotiation and the parties shall amend this agreement and immediately begin to operate in accordance with said recommendations. If the Board fails to make unanimous recommendations within the 24-month period, either party may unilaterally terminate this agreement.

RELATION TO AGREEMENT OF MAY 16, 1960

15. This agreement suspends the Agreement of May 16, 1960, and said Agreement of May 16, 1960, shall be of no force and effect whatsoever so long as this agreement remains in force. Should this agreement be terminated for any purpose, the Agreement of May 16, 1960, shall automatically become effective with both parties reserving their respective rights regarding the interpretation of the provisions thereof.

NEW FACILITIES

16. Any yield created by the construction of a new facility (not presently existing) by either party shall be attributed to the party constructing the new facility, and will require a review as provided for in Article 14. To the extent that water is exported outside the drainage of the Sacramento, Mokelumne, and Calaveras Rivers, the facilities used to convey such water shall be considered as export facilities for the purposes of Article 5.

PROJECT SERVICE AREAS

17. The State and the United States agree that they will respect each others project service areas as defined by long-term contracts of either agency for the furnishing of water.

THIRD PARTY RIGHTS UNAFFECTED

18. Nothing in this agreement is intended to define, determine, limit, or affect the rights of third parties.

EFFECT OF WAIVER OF BREACH

19. The waiver of a breach of any of the provisions of this agreement shall not be deemed to be a waiver of any other provisions hereof or of a subsequent breach of such provisions.

EQUAL EMPLOYMENT OPPORTUNITIES

20. During the performance of this agreement, the State agrees as follows:

(a) It will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. It will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment,

upgrading, demotion, or transfer; recruiting or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. It agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this Equal Opportunity clause.

(b) The State will, in all solicitations or advertisements for employees placed by or on its behalf, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(c) The State will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the State's commitments under this Equal Opportunity clause, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The State will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The State will furnish all information and reports required by said Executive Order, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the Bureau of Reclamation and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the State's noncompliance with the Equal Opportunity clause of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part, and it may be declared ineligible for further Government contracts in accordance with procedures authorized in said Executive Order, and such other sanctions may be imposed and remedies invoked as provided in said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The State will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246, so that such provisions will be binding upon each subcontractor or vendor. It will take such actions with respect to any subcontract or purchase order as the contracting

officer may direct as a means of enforcing such provisions, including sanctions for noncompliance; Provided, however, That in the event the State becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting officer it may request the United States to enter into such litigation to protect the interests of the United States.

CONTINGENT PROVISIONS

21. Performance by the State and the United States shall be contingent on: (1) the availability of Federal funds therefor; and (2) the availability of State funds therefor.

OFFICIALS NOT TO BENEFIT

22. (a) No member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement or to any benefit that may arise herefrom. This restriction shall not be construed to extend to this agreement if made with a corporation for its general benefit.

(b) No official of the State shall receive any benefit that may arise by reason of this agreement other than as a landowner within the Project and in the same manner as other landowners within the Project.

IN WITNESS WHEREOF, the parties hereto, by their
respective officers thereunto duly authorized, have duly
executed this supplement on the day and year first herein-
above written.

THE UNITED STATES OF AMERICA

By _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

DEPARTMENT OF WATER RESOURCES OF
THE STATE OF CALIFORNIA

By _____
Director
Department of Water Resources

STANDARDS
FOR THE SACRAMENTO-SAN JOAQUIN DELTA 1/

BENEFICIAL USES PROTECTED AND LOCATION	PARAMETER	DESCRIPTION	YEAR TYPE	VALUES
<u>MUNICIPAL AND INDUSTRIAL</u>				
Contra Costa Canal Intake at Pumping Plant No. 1	Chloride	Maximum Mean Daily Cl in mg/l	All	250
Contra Costa Canal Intake At Pumping Plant No. 1 or Antioch Water Works Intake on San Joaquin River	Chloride	Maximum Mean Daily 150 mg/l Chloride for at least the number of days shown during the Calendar Year. Must be provided in intervals of not less than two weeks duration (% of Year shown in parenthesis)	Wet Ab. Normal Bl. Normal Dry Critical	Number of Days Each Calendar Year Less than 150 mg/l Chloride 240 (66%) 190 (52%) 175 (48%) 165 (45%) 155 (42%)
City of Vallejo Intake at Cache Slough	Chloride	Maximum Mean Daily Cl in mg/l	All	250
Clifton Court Forebay Intake at West Canal	Chloride	Maximum Mean Daily Cl in mg/l	All	250
Delta Mendota Canal at Tracy Pumping Plant	Chloride	Maximum Mean Daily Cl in mg/l	All	250
<u>AGRICULTURE</u>				
<u>WESTERN DELTA</u>				
Emmaton on the Sacramento River	Electrical Conductivity	Maximum 14-day Running Average of Mean Daily EC in mmhos	Wet Ab. Normal Bl. Normal Dry Critical	0.45 EC April 1 to Date Shown Aug. 15 EC from Date Shown 2/ to Aug. 15 -- Aug. 15 July 1 June 20 June 15 -- 0.63 1.14 1.67 2.70

BENEFICIAL USES PROTECTED
AND LOCATION

PARAMETER DESCRIPTION YEAR TYPE VALUES

AGRICULTURE

WESTERN DELTA

Jersey Point on the San Joaquin River	Electrical Conductivity	Maximum 14-day Running Average of Mean Daily EC in mmhos	Wet	0.45 EC April 1 to Date Shown	EC from Date Shown 2/ to Aug. 15
			Ab. Normal	Aug. 15	--
			Bl. Normal	Aug. 15	--
			Dry	June 20	0.74
			Critical	June 15	1.35
				--	2.20

INTERIOR DELTA

Terminus on the Mokelumne River	Electrical Conductivity	Maximum 14-day Running Average of Mean Daily EC in mmhos	Wet	Aug. 15	--
			Ab. Normal	Aug. 15	--
			Bl. Normal	Aug. 15	--
			Dry	Aug. 15	--
			Critical	--	0.54

San Andreas Landing on the San Joaquin River

Electrical Conductivity

Maximum 14-day Running Average of Mean Daily EC in mmhos

Wet
Ab. Normal
Bl. Normal
Dry
Critical

Aug. 15
Aug. 15
Aug. 15
June 25
--

--
--
--
0.58
0.87

FISH AND WILDLIFE

STRIPED BASS SPAWNING

Prisoners Point on the San Joaquin River

Electrical Conductivity

Average of mean daily EC for the period not to exceed

All

April 1 to May 5
0.55 mmhos

Chipps Island

Delta Outflow Index in cfs

All

April 1 to April 14
6700 cfs

Antioch Waterworks Intake on the San Joaquin River

Electrical Conductivity

Average of mean daily EC for the period, not more than

All

April 15 to May 5
1.5 mmhos

BENEFICIAL USES PROTECTED
AND LOCATION

PARAMETER DESCRIPTION YEAR TYPE VALUES

FISH AND WILDLIFE

STRIPED BASS SPAWNING

PARAMETER	DESCRIPTION	YEAR TYPE	VALUES
Antioch Water Works Intake (continued)	Average of mean Daily EC for the period, not more than the values corresponding to the deficiencies taken (linear interpolation to be used to determine values between those shown)	All - whenever the projects impose deficiencies in firm supplies 3/	Total Annual Imposed Deficiency MAF Apr. 1 to May EC in mmhos
Electrical Conductivity (Relaxation Provision - replaces the above Antioch and Chipps Island Standard whenever the projects impose deficiencies in firm supplies. 3/)			0 1.5 0.5 1.0 1.5 2.0 3.0 4.0 or more

STRIPED BASS SURVIVAL

PARAMETER	DESCRIPTION	YEAR TYPE	VALUES
Chipps Island	Average of the daily Delta outflow index for each period shown not less than	Wet Ab. Normal Bl. Normal Subnormal Snowmelt Dry 4/ Dry 5/ or Critical	May 6-31 June July
			14,000 14,000 11,400 6,500 4,300 3,300 14,000 10,700 9,500 5,400 3,600 3,100 10,000 7,700 6,500 3,600 3,200 2,900

SALMON MIGRATIONS

PARAMETER	DESCRIPTION	YEAR TYPE	VALUES
Rio Vista on the Sacramento River	Minimum 30-day running average of mean daily net flow	Wet Ab. Normal Bl. Normal Dry or Critical	Jan. Feb. 1- Mar. 15 June 30
Computed net stream flow in cfs			2,500 3,000 2,500 2,000 2,000 1,500 5,000 3,000 3,000 2,000

BENEFICIAL USES PROTECTED
AND LOCATION

PARAMETER	DESCRIPTION	YEAR TYPE	VALUES																								
<u>FISH AND WILDLIFE</u>																											
<u>SALMON MIGRATIONS</u>																											
Rio Vista on the Sacramento River (continued)			<table border="0"> <tr> <td></td> <td>July</td> <td>Aug.</td> <td>Sept. 1</td> </tr> <tr> <td></td> <td>3,000</td> <td>1,000</td> <td>Dec. 31</td> </tr> <tr> <td></td> <td>Ab. Normal</td> <td>1,000</td> <td>5,000</td> </tr> <tr> <td></td> <td>B1. Normal</td> <td>1,000</td> <td>2,500</td> </tr> <tr> <td></td> <td>Dry or</td> <td>1,000</td> <td>2,500</td> </tr> <tr> <td></td> <td>Critical</td> <td>1,000</td> <td>1,500</td> </tr> </table>		July	Aug.	Sept. 1		3,000	1,000	Dec. 31		Ab. Normal	1,000	5,000		B1. Normal	1,000	2,500		Dry or	1,000	2,500		Critical	1,000	1,500
	July	Aug.	Sept. 1																								
	3,000	1,000	Dec. 31																								
	Ab. Normal	1,000	5,000																								
	B1. Normal	1,000	2,500																								
	Dry or	1,000	2,500																								
	Critical	1,000	1,500																								
<u>SUISUN MARSH</u>																											
Chipps Island at O&A Ferry Landing	Electrical Conductivity	Maximum 28-day running average of mean daily EC	<table border="0"> <tr> <td></td> <td>Jan.-May</td> <td>Oct.-Dec.</td> </tr> <tr> <td></td> <td>12.5 mmhos</td> <td>12.5 mmhos</td> </tr> <tr> <td></td> <td>Ab. Normal</td> <td>12.5 mmhos</td> </tr> <tr> <td></td> <td>B1. Normal</td> <td>12.5 mmhos</td> </tr> <tr> <td></td> <td>Dry or</td> <td>12.5 mmhos</td> </tr> <tr> <td></td> <td>Critical</td> <td>15.6 mmhos</td> </tr> </table>		Jan.-May	Oct.-Dec.		12.5 mmhos	12.5 mmhos		Ab. Normal	12.5 mmhos		B1. Normal	12.5 mmhos		Dry or	12.5 mmhos		Critical	15.6 mmhos						
	Jan.-May	Oct.-Dec.																									
	12.5 mmhos	12.5 mmhos																									
	Ab. Normal	12.5 mmhos																									
	B1. Normal	12.5 mmhos																									
	Dry or	12.5 mmhos																									
	Critical	15.6 mmhos																									
			(The 15.6 mmhos EC Standard applies only when project water users are taking deficiencies in scheduled water supplies 6/ otherwise the 12.5 mmhos EC remains in effect.)																								
Chipps Island	Delta Outflow Index in cfs	Average of the daily Delta outflow index for each month, not less than values shown	<table border="0"> <tr> <td></td> <td>Wet</td> <td>February-May</td> </tr> <tr> <td></td> <td>Subnormal</td> <td>10,000 cfs</td> </tr> <tr> <td></td> <td>Snowmelt</td> <td>February-April</td> </tr> <tr> <td></td> <td></td> <td>10,000 cfs</td> </tr> <tr> <td></td> <td>Ab. Norm and B1. Norm.</td> <td>January-April</td> </tr> <tr> <td></td> <td></td> <td>12,000 cfs</td> </tr> </table>		Wet	February-May		Subnormal	10,000 cfs		Snowmelt	February-April			10,000 cfs		Ab. Norm and B1. Norm.	January-April			12,000 cfs						
	Wet	February-May																									
	Subnormal	10,000 cfs																									
	Snowmelt	February-April																									
		10,000 cfs																									
	Ab. Norm and B1. Norm.	January-April																									
		12,000 cfs																									
		Minimum daily Delta outflow index for 60 consecutive days in the period																									

BENEFICIAL USES PROTECTED
AND LOCATION

PARAMETER DESCRIPTION YEAR TYPE VALUES

FISH AND WILDLIFE

SUISUN MARSH

Chippis Island
(continued)

Delta Outflow
Index in cfs

Average of the daily
Delta outflow index for
each month, not less
than values shown

All (if greater
flow not required)
by above standard)
- whenever storage
is at or above the
minimum level in
the flood control
reservation en-
velope at two out
of three of the
following: Shasta
Reservoir, Oroville
Reservoir, and CVP
storage on the
American River

Jan.-May
6,600 cfs

OPERATIONAL CONSTRAINTS *

Minimize diversion of
young striped bass
from the Delta

Diversions
in cfs

The mean monthly diver-
sions from the Delta by
the State Water Project(SWP)
(Department) not to
exceed the values shown.
The mean monthly diver-
sions from the Delta by
the Central Valley Project(CVP)
(Bureau), not to exceed
the values shown.

May June July
3,000 3,000 4,600

May June
3,000 3,000

Minimize diversion of
young striped bass into
Central Delta

Closure of Delta cross
channel gates for up to
20 days but no more than
two out of four consecu-
tive days at the dis-
cretion of the Department
of Fish and Game upon 12
hours notice.

April 16-May 31

BENEFICIAL USES PROTECTED
AND LOCATION

PARAMETER DESCRIPTION YEAR TYPE VALUES

FISH AND WILDLIFE

OPERATIONAL CONSTRAINTS *

Minimize cross Delta movement of Salmon

Closure of Delta Cross Channel gates (whenever the daily Delta outflow index is greater than 12,000 cfs) All Jan. 1-April 15

*To the extent that operational constraints on the Central Valley Project to minimize diversion of young striped bass from the Delta during May and June reduce Central Valley Project exports, the State will, through coordinated operations, transport for the United States an amount equal to such reductions during the year by direct diversion or by redirection of stored Central Valley Project water through State Water Project facilities at such times that diversions don't reduce State Water Project yield.

FOOTNOTES

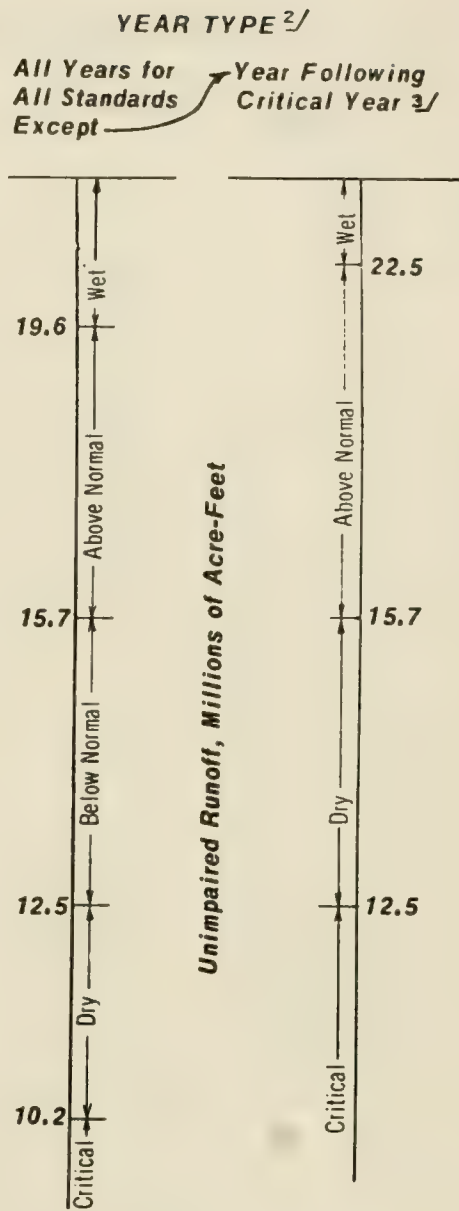
- 1/ Except for flow, all values are for surface zone measurements. Except for flow, all mean daily values are based on at least hourly measurements. All dates are inclusive.
- 2/ When no date is shown in the adjacent column, EC limit in this column begins on April 1.
- 3/ For the purpose of this provision firm supplies of the Bureau shall be any water the Bureau is legally obligated to deliver under any CVP contract of 10 years or more duration, excluding the Friant Division of the CVP, subject only to dry and critical year deficiencies. Firm supplies of the Department shall be any water the Department would have delivered under Table A entitlements of water supply contracts and under prior right settlements had deficiencies not been imposed in that dry or critical year.
- 4/ Dry year following a wet, above normal or below normal year.
- 5/ Dry year following a dry or critical year.
- 6/ Scheduled water supplies shall be firm supplies for USBR and DWR plus additional water ordered from DWR by a contractor the previous September, and which does not exceed the ultimate annual entitlement for said contractor.

NOTE: EC values are mmhos/cm at 25°C.

YEAR CLASSIFICATION

Year classification shall be determined by the forecast of Sacramento Valley unimpaired runoff for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year) as published in California Department of Water Resources Bulletin 120 for the sum of the following locations: Sacramento River above Bend Bridge, near Red Bluff; Feather River, total inflow to Oroville Reservoir; Yuba River at Smartville; American River, total inflow to Folsom Reservoir. Preliminary determinations of year classification shall be made in February, March and April with final determination in May. These preliminary determinations shall be based on hydrologic conditions to date plus forecasts of future runoff assuming normal precipitation for the remainder of the water year.

YEAR TYPE	RUNOFF, MILLIONS OF ACRE-FEET
Wet ^{1/}	equal to or greater than 19.6 (except equal to or greater than 22.5 in a year following a critical year). ^{3/}
Above Normal ^{1/}	greater than 15.7 and less than 19.6 (except greater than 15.7 and less than 22.5 in a year following a critical year). ^{3/}
Below Normal ^{1/}	equal to or less than 15.7 and greater than 12.5 (except in a year following a critical year). ^{3/}
Dry	equal to or less than 12.5 and greater than 10.2 (except equal to or less than 15.7 and greater than 12.5 in a year following a critical year). ^{3/}
Critical	equal to or less than 10.2 (except equal to or less than 12.5 in a year following a critical year). ^{3/}



^{1/} Any otherwise wet, above normal, or below normal year may be designated a subnormal snowmelt year whenever the forecast of April through July unimpaired runoff reported in the May issue of Bulletin 120 is less than 5.9 million acre-feet.

^{2/} The year type for the preceding water year will remain in effect until the initial forecast of unimpaired runoff for the current water year is available.

^{3/} "Year following critical year" classification does not apply to Agricultural, Municipal and Industrial standards.

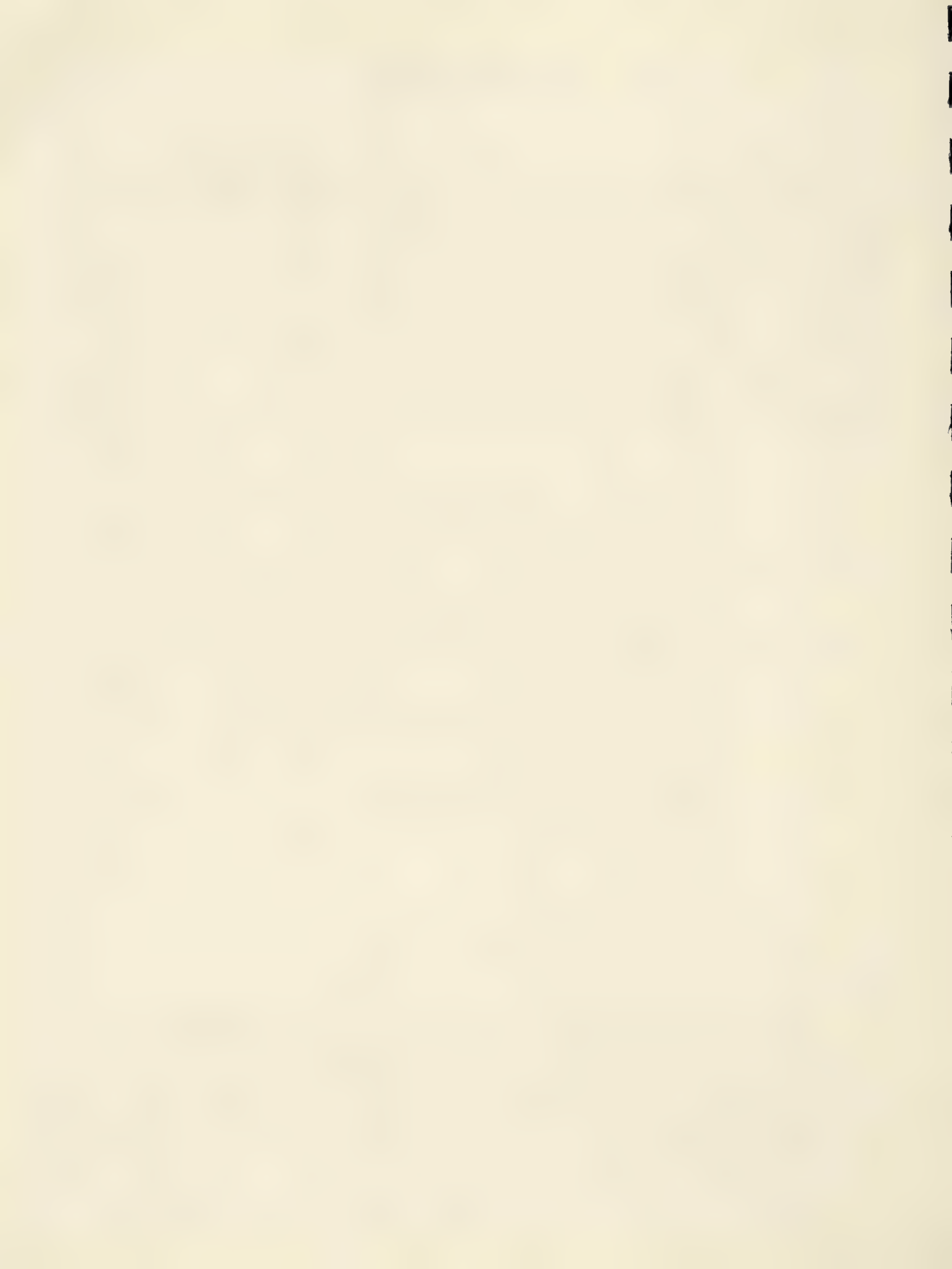


EXHIBIT B-1

CENTRAL VALLEY PROJECT AND STATE WATER PROJECT ANNUAL SUPPLIES
(all figures are in thousands of acre-feet)

<u>Central Valley Project</u>	<u>State Water Project</u>	<u>Total</u>
<u>SACRAMENTO BASIN USE</u>		
Sacramento River below Shasta	2,954	Feather River below Oroville 993
American River Basin	<u>200</u>	<u> </u>
Subtotal	3,154	993 4,147
<u>EXPORT</u>		
Tracy Pumping Plant	3,113	Delta Pumping Plant 2,674
Contra Costa Pumping Plant	90	
Cross Valley Canal	128	
Incremental Supply	432	
	<u> </u>	<u> </u>
Subtotal	3,762	2,674 6,436
DELTA AREA AND OUTFLOW (JOINT RESPONSIBILITY)		<u>4,986</u>
TOTAL		15,569

- Notes: (1) Annual supplies are based on operation study USCAL-2-82. (1928-1934 critical period)
- (2) Annual supplies in some cases include both water right entitlements and project supplemental water.
- (3) The listing of annual supplies by service areas is not intended to restrict the place of use of either party.
- (4) Cross Valley Canal supply relies on transport through State Water Project facilities.
- (5) Incremental supply is developed from remaining storage in Central Valley Project reservoirs at the end of the 1928-1931 critical period and could be made available in the Delta on a firm basis with allowable (25%) deficiencies in critical years. It would require transport through State Water Project facilities.

EXHIBIT B-2

CENTRAL VALLEY PROJECT AND STATE WATER PROJECT FULL DEVELOPMENT ANNUAL SUPPLIES
(all figures are in thousands of acre-feet)

	<u>Central Valley Project</u>		<u>State Water Project</u>		<u>Total</u>
<u>SACRAMENTO BASIN USE</u>					
Sacramento River below Shasta	3,381	Feather River below Oroville	1,031		
American River Basin	<u>1,132</u>				
Subtotal	4,513		1,031		5,544
<u>EXPORT</u>					
Tracy Pumping Plant	3,264	Delta Pumping Plant	2,059		
Contra Costa Pumping Plant	195				
Cross Valley Canal	128				
Incremental Supply	154				
Subtotal	<u>3,741</u>		<u>2,059</u>		5,800
DELTA AREA AND OUTFLOW (JOINT RESPONSIBILITY)					<u>4,918</u>
TOTAL					16,262

- Notes: (1) Figures are illustrative of annual supplies obtainable under the assumptions of operation study USCAL-3-82. (1928-1934 critical period) which assumes full development with existing facilities.
- (2) Annual supplies in some cases include both water right entitlements and project supplemental water.
- (3) The listing of annual supplies by service areas is not intended to restrict the place of use of either party.
- (4) Cross Valley Canal supply relies on transport through State Water Project facilities.
- (5) Incremental supply is developed from remaining storage in Central Valley Project reservoirs at the end of the 1928-1934 critical period and could be made available in the Delta on a firm basis with allowable (25%) deficiencies in critical years. It would require transport through State Water Project facilities.
- (6) American River Basin Supply includes 120 thousand acre-feet for Placer County Water Agency water rights. It is assumed delivered above Folsom.

EXHIBIT C

MONITORING LOCATIONS

<u>No.</u>	<u>*Station Identifier Code</u>	<u>State Location</u>
1	RSAN032	San Joaquin River at San Andreas Landing
2	CHCCC06	Contra Costa Canal at P.P. #1
3	CHWSTO	West Canal at mouth/intake to CCFB
4	RSMKL08	Mokelumne River at Terminous
5	SLCCH16	Cache Slough at City of Vallejo intake
6	RSAC075	Sacramento River at Chipps Island (Mallard Slough)
7	RSAN007	San Joaquin River at Antioch
8	RSAN018	San Joaquin River at Jersey Point
9	RSAC092	Sacramento River at Emmaton
10	CHDMC006	Delta Mendota Canal
11	RSAC101	Sacramento River at Rio Vista
12	RSAC139	Sacramento River at Greens Landing
13	ROLD14	Old River at Holland Tract
14	RSAC081	Sacramento River at Collinsville
15	RSAN112	San Joaquin River at Vernalis
16	B9D801.9 143.2	San Joaquin River at Blind Point
17	**D29	San Joaquin River at Prisoners Point
18	B9D802.0 137.2	Piper Slough at Bethel Island

Unless otherwise agreed, a continuous electrical conductivity (EC) recorder shall be maintained at all of the sites listed above except for the San Joaquin River at Prisoners Point (D29) where only a weekly EC measurement is required between April 1 and May 5 of each year.

*Station Identifier Code used in the Environmental Protection Agency STORET data base.

**Bureau of Reclamation station identifier code. STORET code not available.

Exhibit D
Exchange Procedure to Provide D-1485 Condition 3
Replacement Water (Article 10b of COA)

The California State Water Resources Control Board (SWRCB) Decision 1485 (D-1485) restricts exports from the Delta by the Central Valley Project (CVP) and the State Water Project (SWP) during May and June of each year by limiting each project to a mean monthly export of 3,000 ft³/s. However, Condition 3 of D-1485¹ allows the CVP to make up any deficiency caused by the limitation by exporting at SWP facilities (Condition 3 water). In an effort to minimize the impact of the limitation on CVP and SWP power operations and unless otherwise agreed, this exchange procedure will be followed.

During May and June of each year the CVP shall have the option to provide and the SWP will accept an amount of energy on a mutually agreed upon schedule sufficient to pump some or all Condition 3 water at H. O. Banks Delta Pumping Plant (Banks). Operation under this procedure shall not cause export from the Delta in excess of that shown in Exhibit A. Any energy supplied by the CVP under this procedure will be used for pumping of SWP water at Banks and/or any joint CVP-SWP pumping facility during May and June. Such energy shall be converted to dollars at the then current value of SWP energy and credited to a CVP exchange account (account). During months other than May and June, the SWP shall pump Condition 3 water for the CVP utilizing the account to cover

1

To the extent that operational constraints on the Central Valley Project to minimize diversion of young striped bass from the Delta during May and June reduce project exports, permittee, the United States Bureau of Reclamation, shall be allowed through coordinated operations to make up such deficiencies during later period of the year by direct diversion or by rediversion of releases of stored water through State Water Project facilities.

the cost of associated pumping energy at Banks at the then current value of energy to the SWP. For accounting purposes all Condition 3 water shall be deemed to have been pumped at Banks at a rate of 297 KWH/AF. This rate is based on the rated efficiency of the pumping plant. Any change in the rated efficiency of the pumping plant will result in a correlative change in this KWH/AF rate at Banks.

The CVP shall have the option to convey all Condition 3 water through SWP facilities during July and August. However, it is recognized that the value of energy is time dependent. Therefore, it is likely that the value of energy to pump an amount of water in May and June will be different than the value for pumping an equal amount of water at other times of the year. Prior to April 1 of each year operators of the SWP shall estimate the value of off-peak and on-peak energy for each week of the following twelve months. Prior to April 20 the CVP operators in coordination with the SWP operators shall determine how much CVP energy can be provided for SWP pumping during the May-June period. In the event that the account balance is insufficient to purchase the necessary energy for pumping all Condition 3 water, the CVP may provide and SWP will accept additional energy needed to effect full recovery of Condition 3 water. In the event that the entire quantity of Condition 3 water is received by the CVP prior to the depletion of the account, the SWP shall credit the CVP with energy for additional pumping at Banks Pumping Plant or any joint CVP-SWP pumping facility until the account reaches a zero balance each year.

EXHIBIT E

WATER SHORTAGE AND APPORTIONMENT

1. (a) In its operation of the Central Valley Project (CVP), the United States will use all reasonable means to guard against a condition of shortage in the quantity of water available to the State pursuant to this contract. Nevertheless, if a shortage does occur during any year because of drought, or other causes which, in the opinion of the Contracting Officer, are beyond the control of the United States, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom.

(b) In any year that the Contracting Officer determines there is a shortage in the quantity of water available to customers of the United States from the CVP, the Contracting Officer will apportion available water among the water users capable of receiving water from the same CVP facilities by reducing deliveries to all such water users by the same percentage, unless he is prohibited by existing contracts, CVP authorizations, or he determines that some other method of apportionment is required to prevent undue hardship. In the event reduced deliveries are necessary, the water supplies for both municipal and industrial use, and agricultural use shall be reduced by the same percentage for each contractor.

(c) If operation of the CVP to meet legally required Delta water quality control standards, including Federally adopted water quality standards, causes a shortage in water supply and requires a reduction in deliveries of water to the State under this agreement, such reductions will be made in accordance with subdivision (b) of this exhibit and shall not be deemed a breach hereof.

STATEMENT OF THE
CALIFORNIA DEPARTMENT OF WATER RESOURCES
BEFORE THE

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS
SUBCOMMITTEE ON WATER AND POWER RESOURCES
HONORABLE GEORGE MILLER, CHAIRMAN

BY

DAVID N. KENNEDY
DIRECTOR
DEPARTMENT OF WATER RESOURCES

Mr. Chairman, members of the Committee, I would like to begin my testimony by thanking you for the interest you have shown in the Coordinated Operation Agreement and particularly for giving us the added impetus of this hearing to successfully conclude negotiations in Sacramento.

Before I get into the agreement itself, I believe a little history might be helpful. The Department of Water Resources and the Bureau of Reclamation have operated their respective projects pursuant to a coordinated operations agreement since the first unit of the State Water Project, the South Bay Aqueduct, became operational in 1962. The agreement that is currently in effect was signed May 16, 1960. That agreement was designed (1) to provide a method of allocating shortages in water supplies by prorating the shortage on the basis of specified annual diversion amounts; (2) to resolve the protest of each party to the applications of the other for water rights consistent with these annual diversion amounts and (3) to clear the way for construction of San Luis Reservoir and related facilities.

While the May 16, 1960 agreement provided the basis for coordinated operations, it recognized in Article 16 that further agreement on additional and more specific criteria would be needed for actually operating the two projects on a truly coordinated basis.

Negotiation of operating criteria started in 1961, and continued through May 13, 1971, when a draft agreement was completed. That draft agreement was never executed because of a stipulated judgment obtained in the lawsuit filed by the Environmental Defense Fund which prohibited approval of the agreement until an environmental impact statement had been prepared. However, the 1971 draft did provide an operating procedure for use by the operators of the CVP and SWP to determine proportionally how much water each project must supply from its reservoirs for uses in the Sacramento Valley,

Presented May 23, 1985, in Washington, D.C.

including the Delta, and how much water each project is entitled to export from the Delta. Through 1982, with the exception of 1976, the Department and Bureau operated the projects in a coordinated manner based on annual letters of agreement which essentially followed the terms of the 1971 agreement.

Experience in operating and developing both projects particularly during the 76-77 drought, has shown that actual conditions are significantly different from what was assumed during the negotiations of the May 13, 1971, draft agreement. That agreement was negotiated using the November 19, 1965, Agreement on Delta Water Quality, which assumed a minimum outflow of about 1800 cfs from the Delta to San Francisco Bay. We now know higher minimum outflows are required. (Exhibit B of 1971 shows 2,911,000 acre feet per year for Delta area and outflow - Exhibit B-2 of 1985 shows 4,918,000 acre feet). In 1971, additional facilities were also assumed to be constructed such as a 2 million acre feet Auburn Reservoir, the Peripheral Canal and the Eastside Project of the CVP. Consequently, in 1979 negotiating teams of each agency were established to reevaluate the operating criteria, determine the proportionate water supplies available for each project, and develop a revised operations agreement.

The negotiators initially considered using a procedure based upon the priority of water rights as modified by the 1960 agreement. However, such a procedure was quickly discarded as impractical. Instead, an equitable sharing of water supplies available to the projects was accomplished by a negotiated step-by-step procedure. This procedure met most CVP requirements before utilizing assumed water supplies for the SWP. It was not a determination as to the priority of the water rights between the two projects, but merely a useful mechanism for carrying out practical operations studies. Dams and pumping plants of the Federal CVP were given the first opportunity to use the available water supply and also the first responsibility to meet in-basin needs and assure Delta water quality in compliance with standards (Exhibit A of the Agreement) extracted from the State Water Resources Control Board Decision 1485.

The first study included operation of the existing CVP system, excluding the San Luis Unit, and included all instream prior rights and environmental requirements.

The second study added the SWP system and the federal San Luis Unit. The water supply available for this study was the excess Delta outflow from Study No. 1 and was shared 50/50 between the CVP and the SWP. This sharing was developed through negotiations.

The results of these two studies are shown in Exhibit B of the Coordinated Operation Agreement. These two studies were prepared at both the current level of development and at the assumed "full" level of development (year 2020).

The results of Study No. 2 for the current (1980) level of development were used to design a sharing formula. The resulting

sharing formula provided for CVP/SWP proportionate split of 75/25 responsibility for meeting in-basin use from stored water releases and 55/45 for capture of excess flow. The formula was arrived at by reasoning, trial and error, and negotiation.

I would like to emphasize that the essence of the coordinated operations is the sharing formula, not the water supply figures in Exhibit B-1. The projects are not to be operated to meet predetermined yields but rather to first meet the needs in the areas of origin including the Delta water quality standards and flow requirements contained in Exhibit A; only then is water exported from the Delta. The COA does not affect the rights of third parties (Article 18).

After 25 formal negotiating sessions and innumerable meetings of subcommittees, agreement was once again reached by the negotiating teams in December 1982. Following changes in the management at the Department and Regional Office of the Bureau, negotiations were resumed in 1984 and eight formal sessions were held to address areas of concern, primarily in Articles 10 and 11. I will discuss these in some detail. All formal negotiating sessions were open and attended by representatives from various segments of the public. Agreement was reached by the negotiating teams at the May 6, 1985, meeting.

The basic points included in the agreement are:

1. Both parties agree to meet a specified set of water quality standards (Exhibit A) from State Water Resources Control Board Decision 1485. Article 11 also requires that Exhibit A shall be amended to include any new Delta standards that are not inconsistent with Congressional directives. However, if the Secretary of the Interior determines that new standards are inconsistent with Congressional directives, the Secretary is promptly to request the Department of Justice to bring an action to determine the applicability of the new Delta standards to the United States.

This has been the most difficult area of the agreement. During the long negotiations we have come to realize that there is no other way to deal with possible changes in the water quality standards than to leave it up to the courts under existing law. In 1978 the U. S. Supreme Court ruled in California v. U.S. that the State Water Resources Control Board may impose conditions on the Central Valley Project that are not inconsistent with Congressional directives respecting the project. We have therefore constructed the agreement to be neutral on this legal issue. The disclaimer paragraph in Article 11(d) is designed to assure this neutrality.

The standards do not presently include permanent Suisun Marsh criteria, but the Coordinated Operations Agreement does contain a methodology (Articles 11 and 14) for incorporation of the Suisun Marsh protection features when current negotiations are completed. The Department has constructed, with financial assistance from the

bureau, the first stage facilities to meet Suisun Marsh water quality needs. The extent and timing of additional necessary facilities are subject to on-going negotiations between the Department, Bureau of Reclamation, California Department of Fish and Game and the Suisun Marsh Conservation District. The parties are nearing agreement. Congressional authorization and funding will be necessary for Federal participation. The State Water Resources Control Board will be requested to modify the Suisun Marsh standards in accordance with such agreement.

2. Each project's annual supplies at the 1980 level of development have been established, 6.9 million acre feet (MAF) for the CVP and 3.6 MAF for the SWP (includes 1.0 MAF for Feather River service area). Annual supplies at the 2020 level of development would be 8.4 MAF for the CVP and 3.1 MAF for the SWP (includes 1.0 MAF for the Feather River service area). The determination of these supplies was computed as described earlier.

3. The agreement provides for each party's use of the other's facilities for both short and long-term situations. In accordance with the requirements of State Water Resources Control Board Decision 1485, it provides for conveyance of Central Valley Project water through the California Aqueduct to San Luis Reservoir to make up for the curtailment of pumping during the striped bass spawning period.

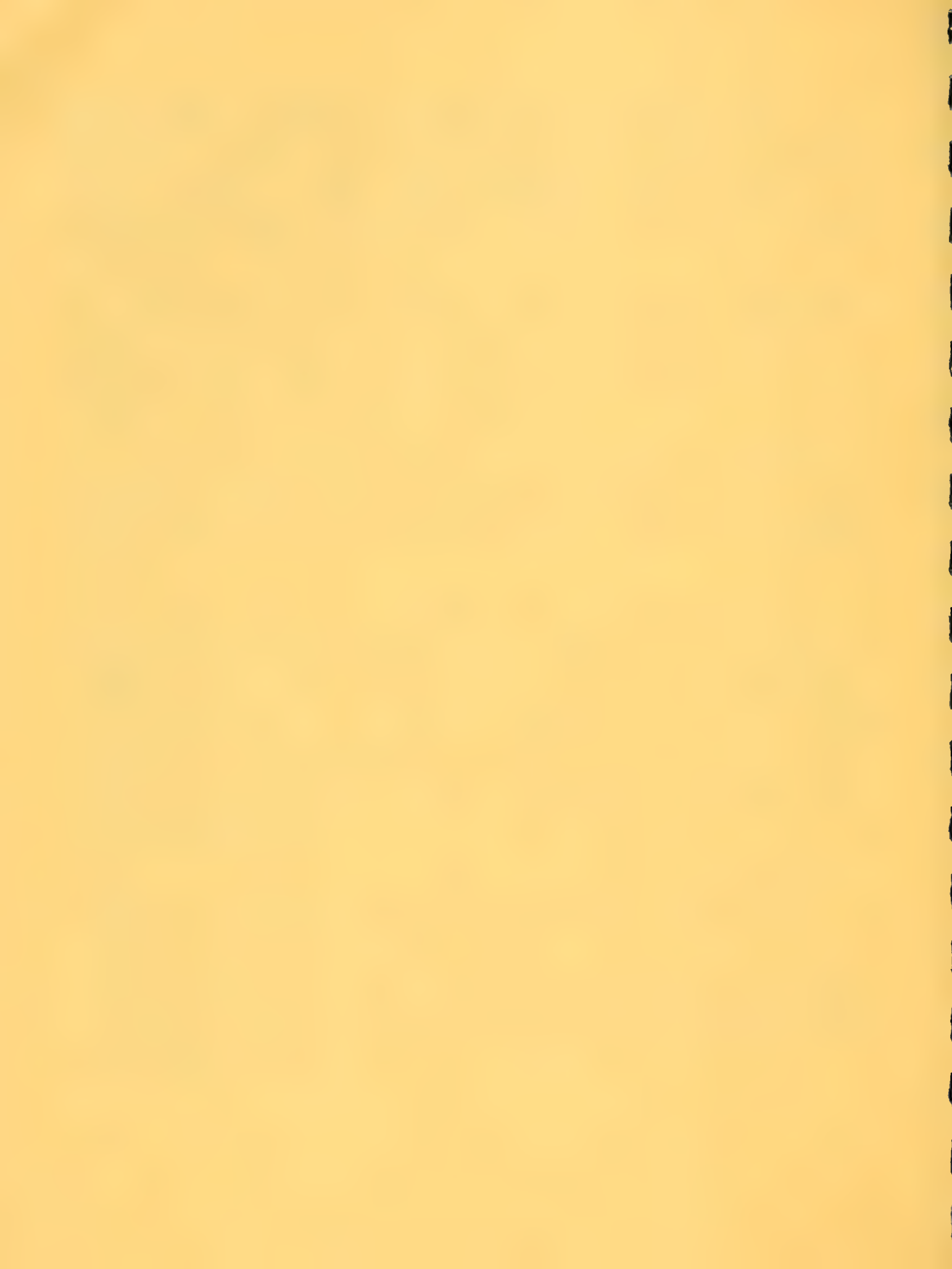
Section 10(h) calls for a contract to be concluded by December 31, 1988, for the purchase of interim CVP water by the SWP and the conveyance of CVP water to federal contractors through the State Aqueduct. The Central Valley Project will have priority equal to that of the State Water Contractors for use of the State Aqueduct for an amount of water equal to the amount purchased by the State from the CVP. In addition, we are committed to providing conveyance service to the CVP for additional CVP water so long as such conveyance does not diminish deliveries or increase costs of water supplies to the State Water Project contractors. If we fail to reach agreement on such a purchase and conveyance agreement, then this coordinated operating agreement may be terminated by either party. (Article 14(b))

Finally the agreement calls for periodic review to determine the success of each party toward meeting its objectives and to make adjustment if necessary to enable the party to develop its respective water supplies. (Article 14)

The Agreement fairly protects the interests of both projects while meeting responsibilities to protect the water-related environment. We strongly urge prompt action by the Congress to allow execution of the Agreement as soon as possible after completion of environmental documentation this fall.

Appendix B

LIST OF PREPARERS



LIST OF PREPARERS

This Environmental Statement/Environmental Impact Report was prepared by the California Department of Water Resources, Central District, 3251 S Street, Sacramento, CA 95816 and the Mid-Pacific Region, U. S. Bureau of Reclamation, 2800 Cottage Way, Sacramento CA 95825. A list of persons who prepared various sections of the Statement, significant background material, or participated to a significant degree in preparing the Statement/Report is presented below.

Name of Agency	Qualifications	Participation
Thomas L. Aldrich FWS	B.S. Wildlife and Fisheries Biology, M.C. Ecology, Wildlife Biologist, 3 years	Wildlife analysis Bay-Delta (excluding Suisun Marsh)
Alan Baracco DFG	B.S. Fisheries Biology; 12 years as Fisheries Biologist with DFG	Delta Fisheries Consultation
L. Ben Everett USBR	M.S. Civil Engineer Civil Engineer 20 years, w/USBR	CVP Reservoir Operation Studies
Walter Fisher DWR	Water Resources Engineering Associate, 34 years in DWR and its predecessors in planning.	Impact Analysis
Michael Ford DWR	B.S. Civil Engineering; 4 years in DWR Delta Branch. Assistant Engineer, W.R.	Hydrodynamic Modeling
Stephen Grippi DWR	B.A., Environmental Studies; Graduate Student Assistant.	EIR Coordination Assistance
Robert Grow DWR	Associate Planner, 7 years in DWR Environmental Planning Programs.	EIR Coordinator; Principal Author
Mary H. Hague USBR	B.S. Civil Engineering-Registered Engineer General, 5 years w/USBR	Power Evaluation

Name and Agency	Qualifications	Participation
Raymond Hoagland DWR	Research Manager (Economics,) B.A., Economics and Mathematics; 9 years in DWR planning.	Economic Analysis
Lester Kaufman USBR	B.S., Engineering M.A., Education M.S., Civil Engineering 9 years w/USBR.	Shasta Lake multi-level structure evaluations.
Douglas Kleinsmith USBR	M.S., Biology Environmental Biologist 3 years w/FREC; Environmental Specialist 5 years w/BLM and USBR	Endangered species analysis; EIS/EIR Coordinator
Richard C. Kristof USBR	M.S., Civil Engineering Hydraulic Engineer; 13 years w/USBR	Salinity/Outflow Relationships
Ron Landingham DWR	Research Analyst I (Economics) B.A., Economics, 2 years in DWR Planning	Economic Analysis
Peter Lee DWR	Program Manager, A.B., Zoology B.S., Oceanography; 3 years as Consultant and 9 years combined experience with Federal/State agencies in environmental planning.	Environmental Analysis
George R. Leidy FWS	B.S. Forestry, Aquatic Biologist, 10 years	Fisheries analysis (Reservoirs)
Kenneth M. Lentz USBR	M.S., Fisheries Fishery Biologist, 14 years w/USBR and 1 year w/DFG	Fisheries analysis
Michael R. Levering USBR	B.S., Agricultural Business Management M.S., Agricultural Economics; Regional Economist, 14 years, Staff Economist, 3 years, with FMC Corporation	Economic and Social Analysis

Name and Agency	Qualifications	Participation
Gordon R. Lyford USBR	B.S. Agricultural Engineering; M.S. Irrigation and Drainage Agricultural Engineer, 8 years w/USBR	Sacramento River Seepage Analysis
Richard J. Morat FWS	B.S. Fisheries Management Biologist, 13 years	Fisheries Analysis (Rivers)
Harold Meyer USBR	B.S. Civil Engineering Civil Engineer; 21 years w/USBR	CVP Reservoir Operation Studies
Marilyn J. Myers FWS	B.S. Natural Resources, B.A. Zoology, M.S. Freshwater Ecology, Fisheries Biologist; 8 years	Fisheries Analysis (Reservoirs)
Thomas H. Richardson FWS	B.S. Wildlife Management Fish and Wildlife, Biologist; 24 years	Fisheries Analysis (Rivers)
Jack Rowell USBR	M.S. Water Resources Engineering; Registered Civil Engineer; 18 years w/USBR	Water Quality Evaluations
Richard Satkowski DWR	B.S., Civil Engineering; Assistant Engineer, W.R.	Engineering Analysis
George Sato DWR	B.S., Soil Science; Senior Land and Water Use Analyst; 26 years with DWR in Planning Investigations	Impacts on Agriculture
Robert L. Schroeder USBR	B.S., Environmental Resources; Environmental Planner, 5 years; Outdoor Recreation Planner with BLM, 3 years; Park Ranger - Resource Management/Combination of 4 years with USFS, Corps of Engineers, California State Parks, and Sacramento County	EIS Coordinator
Lauren B. Scott USBR	B.S., Civil Engineering Civil Engineer, 7 years w/USBR	Sacramento River Bank Erosion Analysis

Name and Agency	Qualifications	Participation
Maurice H. Taylor FWS	B.S., Fish and Wildlife Biology, Fish and Wild- life, Biologist, 34 years	Fish and Wildlife Analysis
Jerry Vayder DWR	Civil Engineer, 34 years w/DWR, Chief of Hydrology and Water Operations Section	Operation Studies
Frank Wernette CDFG	B.S. Wildlife Management, 10 years Experience in Wildlife Biology	Suisun Marsh Consultation
Vera L. Padjen	Research Writer, 8 years writing experience with DWR	Editing
Karl Winkler DWR	B.S. Civil Engineering Section Chief - Delta Alternatives Planning Studies; 13 years w/DWR	Project Manager Engineering and Environmental Analysis
Phil Wendt DWR	M.S. Marine Biology, 3 years Environmental Specialist DWR; 5 years w/Texas Instruments; 4 years w/Lockheed Center for Marine Research	Environmental Analysis, EIR/EIS Review
David Brown DWR	M.S. Biology, 13 years w/DWR, Environmental Specialist	Environmental Analysis, EIR/EIS Review

Appendix C

CONSULTATION AND COORDINATION

CONSULTATION AND COORDINATION

Development of the Draft Coordinated Operation Agreement (COA) and preparation of the draft EIS/EIR have been a cooperative effort through negotiations between the Department of Water Resources and the Bureau of Reclamation. In 1979 negotiating teams were established to reevaluate criteria, determine the water supplies available for each project, and develop an operations agreement. Since then 25 formal negotiating sessions and innumerable working meetings of subcommittees have taken place. All formal negotiating sessions have been open and attended by representatives from various segments of the public.

Additionally, as a significant element of the COA, Decision 1485, a State Law established to protect Delta water quality, was instituted after years of study and evaluation and included a wide spectrum of public involvement and review by the State Water Resources Control Board (SWRCB). D-1485, which essentially is the same as Exhibit A of the COA excluding Suisun Marsh facilities, was the culmination of 32 days of evidentiary hearing initiated on November 15, 1976 and concluded on October 7, 1977. Also, the EIR prepared for D-1485 underwent considerable public review. All reviews required by the California Environmental Quality Act have been satisfied. Drafts of D-1485 and the EIR were released for public review on March 15, 1978. Following a review period of over 75 days, a public hearing on the draft EIR was held on May 30, 1978. The hearing record was left open until June 15, 1978, in order to accommodate written comments.

Over 40 parties submitted extensive comments on the draft EIR. The commenting parties included Federal and State agencies, water service contractors, Delta water agencies, municipal and industrial

users in Central Costa County, fish and wildlife interests and environmental groups.

In preparation for development of the draft EIS/EIR for the COA public scoping sessions were conducted in four different locations throughout northern and central California from August 4 to August 30, 1983. The scoping process, a requirement of the National Environmental Policy Act (NEPA), was intended to provide members of the public with an opportunity to help determine the scope of the EIS/EIR and assist in identifying the significant issues that may be related to implementation of the draft COA.

The public notice to conduct scoping meetings was distributed to about 1,500 agencies, organizations, media, and individuals. Written and/or verbal comments were accepted from representatives of concerned Federal, State and local agencies, organizations, and other individuals. These comments were received either by the Bureau or the Department of Water Resources, or were received at one of the four public scoping meetings.

The major comments received from scoping participants were categorized into the following topic areas.

1. Operations
2. San Francisco Bay-Delta
3. Water Contracts
4. Area of Origin
5. Upstream Effects
6. New Facilities
7. Growth Inducing
8. Navigation
9. General

All comments were given consideration in developing the scope and in identifying significant issues for evaluation and presentation in the joint EIS/EIR.

The Fish and Wildlife Service (FWS) and the California Department of Fish and Game (DFG) provided significant input for the EIS/EIR. The Department of Fish and Game agreed to have the FWS be the lead agency having responsibility for submission of project fish and wildlife evaluations related to the Sacramento and American Rivers; Shasta, Folsom, Oroville, Whiskeytown, and Trinity Lakes, and reregulating reservoirs; joint facilities (canals and reservoirs) south of the Delta; the Sacramento Valley bypasses and flood basins. It was agreed that DFG would have similar responsibilities for Bay, Delta, Feather River, Suisun Marsh, and State Water Project service areas. All evaluations were to be coordinated among the wildlife agencies before submission. Specific recommendations by the Fish and Wildlife Service are as follows:

Recommendation No. 1: Limiting the water-level fluctuation during the centrarchid spawning period would be the most valuable mitigative measure possible to lessen the impact of the drawdowns expected under the proposed action. Drawdown need not be detrimental to the centrarchid fishery if consideration is given to the requirements of the spawning fish. Exact dates, when fluctuation should be limited, cannot be stated since these will vary from reservoir to reservoir and from year to year depending on water temperature. However, criteria could be developed, with input from California Department of Fish and Game biologists, that would be specific for each reservoir.

Response No. 1: For each reservoir, operational criteria must be compared to centrarchid fishery requirements in order to determine what operational conflicts exist if adjustments to benefit a particular reservoir fishery are made. The Bureau in recent years has attempted similar activities through coordination with the Department of Fish and Game for Black Butte, Stony Gorge, and East Park Reservoirs. The Bureau and DWR will work with the Fish and Wildlife Agencies in order to operate the reservoirs in a manner advantageous to fish, given the other mandatory and contractual obligations that must be considered paramount.

Recommendation No. 2: At the 1980 level of development both Folsom Lake and Lake Oroville would have critically low water volumes which might lead to the elimination or reduction of sport fish populations. Re-introduction of game fishes would be required should such a circumstance arise.

Response No. 2: If reservoir sport fish populations are severely reduced or eliminated, the Bureau and/or DWR depending on the circumstances, would cooperate to help bring sport fish populations back to preferred levels.

Recommendation No. 3: Increased delay time for adult migrating anadromous fish at the Red Bluff Diversion Dam, although anticipated to be minimal because of COA impacts, may be prevented by improving existing fishway attraction flow. Several measures are currently being studied or scheduled for implementation under the Bureau of Reclamations's RBDD Fish Passage Action Program.

Response No. 3: As stated, the Bureau is studying the possibilities to improve the situation at RBDD. The purpose of this program is to develop a method to improve fish passage at Red Bluff Diversion Dam on the Sacramento River. The river is a major migratory route for chinook salmon and steelhead trout which spawn upstream from Red Bluff Diversion Dam. Because of their importance to the commercial and sports fisheries of California, there is a great concern that Red Bluff Diversion Dam impedes fish migration to their natural spawning habitat.

Federal authority for this action program stems from Public Law 839, 81st Congress (64 Stat. 1036) of September 26, 1950, which reauthorized the Central Valley Project to include the Sacramento Valley Canals Unit, and the Fish and Wildlife Act (48 Stat. 401), as amended, 16 USC 661, et seq.)

Additional authority to implement construction may be required if it is determined major structural modifications to Red Bluff Diversion Dam are necessary.

Recommendation No. 4: The most important loss prevention or compensation measures which should be provided to prevent adverse water temperature impacts in the Sacramento River are improved temperature control capabilities for Shasta Dam and/or increased releases of cooler water from the Trinity River system during these critically dry years. A selective level release capability to discharge cooler hypolimnion water from Shasta Lake should reduce the projected 1 to 4 °F warming of Sacramento River flows

during the periods when background levels are equal to or greater than 56 °F. The effectiveness of this measure will be determined from Central Valley Fish and Wildlife Management Study problem No. C-2 model studies.

Selective withdrawal release capability from Lake Shasta would not only prevent adverse river temperature impacts on anadromous fish resources in the Sacramento River with the COA, but will, to some extent, reduce the predicted without-project adverse temperatures under 2020 operating conditions.

Response No. 4: The proposed action may significantly impact fish resources, principally chinook salmon in the Sacramento River, primarily as a result of hydrological and water temperature changes. These impacts will occur only during critical dry years and consequently, temperature control facilities should not be attributed solely to the COA; especially since the cost of facilities are ranging from \$11 million to 17.5 million to construct.

It is estimated, the frequency of significant impacts will be 3.6 percent, having occurred in only 3 out of 83 years of record analyzed by computer simulation (1931, 1933 and 1934). The frequency of minor impacts will be 2.4 percent, having occurred in only 2 years of records simulations (1924 and 1977). No impacts were identified in the remaining 77 years of record analyzed from 1895 through 1977.

The analysis of impacts due to hydrological changes was based on operation studies provided by the BR and DWR. The data utilized for analysis were mean monthly flow (expressed in ft^3/s) for specific river locations. The best available knowledge of the relationship between riverflow and salmon habitat was used to subjectively evaluate those specific months where hydrological changes would be significant. In some cases this was the professional opinion of biologists of the California Department of Fish and Game and U.S. Fish and Wildlife Service. In other cases it was actual instream flow needs study data.

Mean monthly operation studies are by far not the most desirable data to be used for purposes of fishery analysis; mean daily operation studies are much preferred but are almost never made available because of high cost. For example, in months where flood control operation occurs it would not be unexpected, depending on the river and reservoir involved, to have daily flows ranging by a factor of 20 times or more. Fish production at certain life stages is often determined by the lowest daily flow. Therefore, analysis using mean monthly data can often be inaccurate.

While it is true that daily temperatures will fluctuate around the monthly mean temperature, there undoubtedly will be thermal refuges along the river which will provide some relief from the excessive temperatures. These refuges exist as deep pools, coldwater springs, shaded bank areas, etc. The frequency, location and seasonal occurrence of these refuges in suitable spawning areas, in most

cases are largely undocumented. Salmon instinctively seek out thermal refuges and will congregate in these areas. Consequently, daily river temperature values in excess of the stated critical maxima may not necessarily result in a corresponding change in the salmon mortality rate. Spawning temperature criteria are based on controlled temperature testing where temperatures are typically uniform and the fish cannot escape. This is not the prevailing condition in the Sacramento River, the Trinity, or most other rivers. However, the ability to vary the temperature of the water released from Shasta Lake is being studied under the Central Valley Fish and Wildlife Management Study.

A computer model of Shasta Lake and upper Sacramento River is evaluating the effect on downstream temperatures of a multilevel intake structure attached to the upstream face of Shasta Dam, and a diversion tunnel modification. Preliminary appraisal-level designs and cost estimates have been prepared. A multilevel intake structure would cost about \$17.5 million to construct. Modification of the diversion tunnel would cost \$11 million. The computer model is showing that the effectiveness of these designs may be too limited. Changes to the designs are being studied for extra flexibility to select waters from additional reservoir levels. Changes in the design and cost estimates may result. The study is scheduled for completion in late 1985, and if a design is found feasible it would require congressional authorization before it could be constructed.

Recommendation No. 5: Implementation of source control of structural measures to control toxic metal waste discharge from the Spring Creek basin are potential loss prevention measures which should be provided to offset losses of anadromous fish resulting from COA operations. Alternative measures are described in the problem #C-1 report on Spring Creek Heavy Metal Toxicity prepared for the Bureau's Central Valley Fish and Wildlife Management Study.

Response No. 5: The Bureau has completed its appraisal-level study of the Spring Creek problem. The Environmental Protection Agency and the State Department of Health Services are funding studies utilizing the Bureau's study report. This should be completed in early 1985. If the Bureau were to help construct facilities resolving the Spring Creek pollution problem, Congressional Authorization would probably be required.

Endangered Species Consultation: The Bureau received from the Endangered Species office a list of species for evaluation within the area affected by the project. The Bureau prepared a Biological Assessment and found no effect on Endangered Species. In furthering the purposes of the Act the Bureau transmitted a copy of our Assessment to the Endangered Species office of the Fish and Wildlife Service on February 16, 1984, and received official concurrence from the U.S. Fish and Wildlife Service on March 21, 1983.

Cultural Resources: There will be no direct effect to cultural resources on or Eligible to the National Register of Historic Places. We have requested "Determination of No Effect" from the State Historic Preservation Officer.

Coordination For Review of the Draft Environmental Statement/Environmental Impact Report: The draft environmental document is being sent for review and comment to all agencies, organizations and individuals who have expressed an interest in the COA. During the review period one or more public hearings will be held in the effected areas to receive comments on the adequacy of the statement.

Distribution For Review and Comment

1. Federal Agencies

Copies were distributed to the following by the Commissioner,
Bureau of Reclamation for review and comment.

a. U.S. Department of the Interior

Bureau of Indian Affairs
Bureau of Land Management
Bureau of Mines
Fish and Wildlife Service
Geological Survey
National Park Service
Western Region Office - Secretary of Interior

b. Other Federal Agencies

Advisory Council on Historic Preservation
Council on Environmental Quality
Department of Agriculture
Department of the Army
Department of Commerce

Department of Energy

Bonneville Power Administration

Federal Energy Regulatory Commission

Department of Health and Human Services

Department of Housing and Urban Development

Department of Transportation

Environmental Protection Agency

c. U.S. Senators

Honorable Alan Cranston and Pete Wilson

d. U.S. Congress

Douglas H. Bosco; Anthony C. Beilenson; Eugene A. Chappie;
Henry A. Waxman; Robert T. Matsui; Edward R. Roybal;
Vic Fazio; Howard L. Berman; Phillip Burton; Mel Levine;
Barbara Boxer; Julian C. Dixon; George Miller; Augustus
F. (Gus) Hawkins; Ronald V. Dellums; Matthew G. Martinez;
Fortney H. (Pete) Stark; Mervyn M. Dymally; Don Edwards;
Glenn M. Anderson; Tom Lantos; David Dreier; Edwin V. W.
Zschau; Esteban E. Torres; Norman Y. Mineta; Jerry Lewis;
Norman D. Shumway; George E. Brown, Jr.; Tony Coelho;
Alfred A. McCandless; Leon E. Panetta; Jerry M. Patterson;
Charles Pashayan, Jr.; William E. Dannemeyer; Richard H.
Lehman; Robert E. Badham; Robert J. Lagomarsino; Bill Lowery;
William M. Thomas; Dan E. Lungren; Bobbi Fiedler; Ronald
C. Packard; Carlos J. Moorhead; Jim Bates; Duncan L. Hunter

2. Federal Agencies

Copies were distributed to the following by the Regional Director,
Bureau of Reclamation for information only.

a. Department of the Interior

Regional Environmental Officer, San Francisco, California

Bureau of Indian Affairs, Sacramento, California

Fish and Wildlife Service, Portland, Oregon and

Sacramento, California

National Park Service, San Francisco, California

Geological Survey, Menlo Park, California

Bureau of Land Management, Sacramento, California

Bureau of Mines, Spokane, Washington

b. Other Federal Agencies

Department of Agriculture

Forest Service, San Francisco, California

Soil Conservation Service, Davis, California

Department of the Army, Corps of Engineers, San Francisco

and Sacramento, California

Department of Health, Education and Welfare, San Francisco,

California

Department of Energy, WAPA, Sacramento, California

Department of Transportation, Federal Highway

Administration, San Francisco, California

3. State and Local Agencies

Copies were distributed to the following by the Regional Director,
U.S. Bureau of Reclamation for review and comments:

a. California State Senators

Ray Johnson; Dan McCorquodale; Barry Keene; Henry J. Mello;
John Doolittle; Leroy F. Greene; James W. Nielsen;
Wadie P. Deddeh; Milton Marks; Herschel Rosenthal;
John Francis Foran; Edward R. Royce; Ed David; Alan Robbins;
Jim Ellis; Newton R. Russell; Nicholas C. Petris; John Seymour;
Daniel E. Boatwright; David A. Roberti; Alfred E. Alquist;
Art Torres; Ollie Speraw; H.L. Richardson; John R. Garamendi;
Joseph B. Montoya; Rose Ann Vuich; Robert G. Beverly;
Walter W. Stiern; Ralph C. Dills; Gary Hart; Bill Greene;
Bill Lockyer; Diane Edith Watson; Ken Maddy; Ruben S. Ayala;
Paul B. Carpenter; William "Bill" Campbell; William A. Craven;
Robert Presley,

b. California State Assemblymen

Stan Statham; Tom Bane; Doris Allen; Patrick J. Nolan;
Rusty Areias; Bill Jones; Thomas M. Hannigan; Richard Katz;
Jean Moorhead; Lucy Killes; Norman Waters; John Klehs;
Charles W. Bader; Mike Roos; William J. Filante; Teresa Hughes;
Dyron D. Sher; Maxine Waters; William P. Baker; Gwen Moore;
William R. Bradley; Curtis R. Tucker; Tom Bates; Ernest L. Konnyu;
Elihu M. Harris; Gerald N. Felando; Bruce Bronzan; Marian LaFollette;
Charles M. Calderon; Frank Vicencia; Art Agnos; Richard Alatorre;
Willie L. Brown; John R. Lewis; Robert J. Campbell, Dave Elder;

b. California State Assemblymen (cont'd)

Louis J. Papan; Dennis L. Brown; Robert W. Naylor;
Burt M. Margolin; Steven Clute; Sally Tanner;
Tom Hayden; Richard Mountjoy; John Vasconcellos; Bill Lancaster;
Gary Condit; Bruce E. Young; Alister McAlister; Tom McClintock;
Lloyd G. Connelly; Terry Goggin; Dominic Cortese; William R. Leonard;
Gary Davis; Sunny Mojonier; Sam Farr; Ross Johnson; Jim Costa;
Gloria Molina; Richard E. Floyd; Jack O'Connell; Nolan Frizzelle;
Richard Robinson; Don Rogers; Steve Peace; Phillip D. Wyman;
Marian Bergeson; Dan Hauser; David G. Kelley; Wally Herger;
Robert C. Frazee; Frank Hill; Eric Seastrand; Philip Isenberg;
Don A. Sebastiani; Patrick Johnston; Peter R. Chacon; Cathie Wright.

c. State Agencies

California State Clearinghouse, Office of the Governor
Sacramento, CA.

d. Local Agencies

South Delta Water Agency; San Joaquin County Flood Control and
Water Conservation District; Alameda County Water District;
Hospital Water District; Westlands Water District; Arvin-Edison
Water Storage District; Wheeler Ridge-Maricopa Water Storage
District; Kern County Water Agency; Tulare Irrigation District;
Calwelo Water District; Four Water Districts Commission;
Terra Bella Irrigation District; Berrenda Mesa Water District;
Rag Gulch Water District; Glenn-Colusa Irrigation District;
Orland-Artios, Tehama-Colusa Water Users Association; Westside
Water District; Shasta County Water Agency; Metropolitan Water
District of Southern California; Anderson-Cottonwood Irrigation
District; Shasta Dam Area Public Utility District, City of Redding;

d. Local Agencies (cont'd)

Bella Vista Water District; Clear Creek Community Services District; City of Antioch; Contra Costa Water Agency; East Bay Municipal Utility District; Board of Supervisors, Marin County; Board of Supervisors, Contra Costa County; Suisun Resource Conservation District; City of Fairfield; Tulare Lake Basin Water and Irrigation District; Central Delta Water Agency; Lower Tule River Irrigation District; Orange County; Contra Costa Water District; Santa Clara Valley Water District; Rosedale-Rio Bravo Water Storage District; East Contra Costa Irrigation District; Reclamation District 2060; Casitas Municipal Water District (Robert N. McKinney); Director of Contracts Admin. Metro. Water District of Southern California; Association of California Water Agencies; San Gabriel Valley Municipal Water District; Yuba County Water District; Reclamation District 2064; Banta-Carbona Irrigation District; Kings County Planning Agency; Mojave Water Agency; Sonoma County Library; San Bernardino County Library; Butte County; Glenn County Planning Department; San Diego State University Library; South San Joaquin Irrigation District; Solano County Public Works; Kern County Planning; Provident Irrigation District; Kanawha Water District; Calaveras County Planning Department; Plumas County Flood Control and Water Conservation District; San Juan Suburban Water District; Tulare County Board of Supervisors; Columbia Canal Company; Desert Water Agency; San Geronio Pass Water Agency;

d. Local Agencies (cont'd)

Keswick Community Services District; Yolo County Flood Control and Water Conservation District; Kings County Water District; San Luis Canal County; San Benito County Water Conservation and Flood Control District; Madera Irrigation District; Coachella Valley Water District; Saucelito Irrigation District; Third (Seaside) District; Princeton-Codora-Glenn Irrigation District; Central San Joaquin Water Conservation District; Sacramento Municipal Utility District; Glenn County Board of Supervisors; Northridge Water District; County of Tuolumne Board of Supervisors; Modesto Irrigation District; Monterey County Flood Control and Water Conservation District; Glide Water District; Yolo-Zamora Water District; Trinity Recreational Association; Dunnigan Water District; Water Storage District; Placer County Board of Supervisors; Colusa County Water District; Centerville C.S.D.; Reclamation District No. 108; El Dorado County Water Agency; City of Folsom; El Dorado Irrigation District; Grassland Water District; Shafter-Wasco Irrigation District; City of Coalinga; Devil's Den Water District; City of Concord; Green Valley Water District; City of Concord; Trinity County; Foresthill Public Utility District; City of Stockton; Thomas Creek Water District; Antelope Valley East Kern Water Agency; Sacramento County Water Agency; Palm Springs Public Library; Bethel Island Municipal Improvement District; Brannan-Andrus Levee Maintenance District, Contra Costa; Broadview Water District; Fresno County Farm Bureau; Castic Lake Water Agency; City of Redding;

d. Local Agencies (cont'd)

Central California Irrigation District; Pacheco Water District;
Palmdale Water District; Orange Cove Irrigation District;
Corcorvan Irrigation District; Chowchilla Water District;
San Bernardino Valley Municipal Water District; Dudley Ridge
Water District; Alpaugh Irrigation District; Delano-Earlimart
Irrigation District; Wasco Semitropic Water Storage District;
Westley Hospital Water District; Sacramento State Agency
Relations; Shasta County; El Cerrito Water Contra Costa
Conservation League; Fairfield Public Works Department;
Alameda County Flood Control and Water Conservation District;
Orland-Artois Water District; Tulare Lake Basin Water Storage
District; Stanislaus County; City of Rio Vista; Alameda County
Flood Control and Water Conservation District; South Pasadena;
Corcoran State Water Contractors Audit Committee; San Diego;
Sacramento County Environmental Section; California Department
of Fish and Game; San Joaquin County; San Bernardino County;
North Delta Water Agency; James Irrigation District; Mercy
Springs Water District; City of Watsonville; Union Island
Reclamation District No. 2; Santa Clara Valley Water District.

e. Organizations

Bay Institute of San Francisco; State Water Contractors;
J.B. Summers CE, Inc.; California Farm Bureau; CH2M Hill;
Montgomery Engineers; Environmental Defense Fund; Marin
Conservation League; Soil Conservation Society of America;
Thousand Friends of Contra Costa; United Anglers of California;

e. Organizations (cont'd)

California Wildlife Federation; Save San Francisco Bay Association; California Academy of Sciences; Buena Vista Audubon Society; Northern California Committee for Environmental Information; CSPA (Alliance); Cooperative Extension University of California, Science and Industry Department; Western Water Education Foundation; Pacific Rod and Gun Club; Burris, Lagerlof, Swift, and Senecel, Ocean Society; San Francisco Ocean Society; Sierra Club; River Garden Farms Co.; Klein Bros. Inc.; Nedrick-Hugbee Insurance Service (United Anglers of California); Minasian, Minasian, Minasian, Spruance, Baber, Meith and Soares, Attorneys at Law; Friends of the Earth; James Hansen and Associates; Friant Water Users Association; California Water Resources Association; Klamath-Trinity River Coalition, Inc.; Friends of the River; Newhall Land and Farming Co.; Natural Resources Defense Council; Redding Chamber of Commerce; Pacific Gas and Electric Company; Murray, Burns and Kielen; California Waterfowl Association; Lake Shasta Caverns; California Fly Fishermen Unlimited; Delta Water Users Association; Sequoia Audubon Society; San Joaquin River Water Users Company; California Striped Bass Association; San Francisco Oceanic Society; Bookman-Edmonston Engineering, Inc.; TERA Corporation; Stockton Sportsmen Club; R.L. Mitchel Associates; Laguna Hills Audubon; Association of California Water Agencies; Agricultural Stability and Conservation SVS Association; Delta Environmental Advisory Committee; Resource Management Associates; San Felipe Committee;

e. Organizations (cont'd)

Marine Research Center; San Jose Sportsmens Club;
National Water Resources Association; R.L. Schafer and
Associates, Inc.; Stetson Engineers, Inc.; Salmon Unlimited;
Leedshill-Herkenhoff, Inc.; Sacramento League of Women Voters;
National Audubon Society; Alove Distributers; California
Wildlife Federation.

f. Individuals

Joe Wardhofer; John Murray; Thomas W. Curran; Joe Sherman;
Dean Sherman; Jack Kaiser; D.S. Ashmore; Dale Sanders;
Mike Geranio; Harry S. Dixon; Francis H. Saunders; Allan Thode;
John L. Winther; Parker M. Holt; Ernest A. Engelburt; Michael Smith;
Fredrick Bold, Jr.; Mary C. Jacks; Merrill R. Goodall; F.B. Young;
Tila N. Collin; William E. Warng; Yosh Hamatani; Lee Walton;
C.R. Van Buskirk; R.V. Thomas; D.W. Kelly; Arliss Unger;
Tom Kearcher; Richard W. Dickenson; Harold A. Keelen, Jr.;
James E. Cummins; Dean Thompson; Peter OHM; Leroy Dutra;
Richard M. Boswell; Samuel E. Wood; Verne L. Roberts;
Richard Sitts; Col. R. Dana Fish; Pete Ratto, Sr.; Eunice Hunt;
Ronald Robie; Paul E. Minor; Edgar Wilson; Ken G. Murray;
Albert A. Amaro; Wes Anderson; Sally M. Felt; Stacy Lee;
Walter C. Sniz; Amalio Gomez; Vernon Bengal; Galen Whitney;
Robert Pafford; Chet Sarsfield; R.W. Hollis; Don Kelley;
Adolph Moskovitz; Seralo Meral; E.F. Dibble; Kelly Nimtz;
R.J. Hendricks; Alfred R. Golze; Robert E. Thorsen; Michael Simpson;
L.K. Donlin; Edward Taylor; Dorothy Green; Wayne Waters;
Marshall Jones.

g. Media

Stockton Record

Lodi News Sentinel

KHSL - TV, Redding

Record Searchlight

Oakland Tribune

San Francisco Chronicle

Capital Tipster Newsletter

Tracy Press

MP-780

FEB 10 1984

565.

To: Project Leader, Endangered Species Office, Fish and Wildlife Service, 1230 N Street, Sacramento, CA

From: Regional Director, Sacramento, CA

Subject: Biological Assessment for Species within the Project Area of the Coordinated Operation Agreement

In furthering the purposes of the Endangered Species Act of 1973, as amended, we are sending you for your information our Biological Assessment identifying no effect on endangered species or their critical habitat by the implementation of the proposed Coordinated Operation Agreement. Also enclosed is a copy of the proposed agreement.

If you should have questions concerning the assessment, contact Bob Schroeder, MP-790, at 484-4507.

Enclosures 2

RSchroeder:lh 2-13-84





United States Department of the Interior

FISH AND WILDLIFE SERVICE
SACRAMENTO ENDANGERED SPECIES OFFICE
1230 "N" Street, 14th Floor
Sacramento, California 95814

MAR 20 1984

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BUREAU OF RECLAMATION OPERATING AGREEMENT	
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130	

MEMORANDUM

TO: Regional Director, Bureau of Reclamation, 2800 Cottage Way,
Sacramento, CA 95825

FROM: Acting Project Leader, Sacramento, CA (SES0)

SUBJECT: Endangered Species Biological Assessment, CVP-SWP Coordinated
Operating Agreement (1-1-84-I-209)

We have reviewed the subject document and concur with your assessment that coordinated operation of existing State and Federal water facilities will not effect endangered species in a manner distinguishable from other influences in the Central Valley. Speculative arguments might even be made that certain species, such as the clapper rail and harvest mouse, have benefited from reduced freshwater inflows resulting from operation of water facilities. Conversely, San Joaquin Valley endangered species have clearly been harmed by agricultural expansion made possible by State and Federal water transport.

New water contracts and/or new project facilities are apparently neither assured nor precluded by the Coordinated Operating Agreement. Thus these additional water project elements would remain subject to future consultation procedures pursuant to the Endangered Species Act.

Richard J. Navarre

cc: Regional Office, Portland, OR (AFA-SE)

Appendix D

BIOLOGICAL ASSESSMENT OF THE
IMPACTS OF THE COORDINATED OPERATION AGREEMENT
TO FEDERALLY LISTED THREATENED OR ENDANGERED SPECIES

APPENDIX D

BIOLOGICAL ASSESSMENT OF THE IMPACTS OF THE
COORDINATED OPERATION AGREEMENT TO FEDERALLY LISTED
THREATENED OR ENDANGERED SPECIES

Prepared by
U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Regional Office
Sacramento, California

January 1984

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INTRODUCTION

The U.S. Bureau of Reclamation (Bureau) and the California Department of Water Resources (DWR) completed negotiations in December 1982 on a draft operation agreement to coordinate the operations of the Federal Central Valley Project (CVP) and the State Water Project (SWP).

In April 1983, the Bureau requested a list of federally listed endangered and threatened species. The list was compiled by the Fish and Wildlife Service's Sacramento Endangered Species Office. The Bureau expanded the study area in October and November and subsequently received a revised list in December.

DESCRIPTION OF THE PROJECT

NEED FOR ACTION

The CVP, SWP, and other projects of the Federal, State, and local governments and private agencies store and divert water in, and export water from, the Sacramento Valley basin. See figure 1. They do so under conditions established in various laws, court orders, quasijudicial orders, administrative policies, and other guiding instruments. Each agency properly regards the water it has developed as valuable property to be retained and controlled.

Unless kept separate, the water of one project is physically indistinguishable from that of another. Since many projects, the CVP in particular, use the same stream channels simultaneously to convey water, a coordination agreement is needed to assure that each project retains its share of the commingled water and bears its share of joint obligations to protect beneficial uses, including those of the water-related environment. Coordination also facilitates more efficient use of the available water resources.

DWR and the Bureau entered into an agreement dated May 16, 1960, to remove the State as a protestant at the Bureau hearing on the Sacramento River and the Delta. A draft supplemental COA detailing operating procedures by the two agencies was prepared by 1971. This 1971 draft COA was never signed because a court judgment obtained by the Environmental Defense Fund prohibited execution of the COA until an environmental document was prepared in accordance with the National Environmental Policy Act.

FIGURE 1
 MAJOR FEATURES OF
 THE SWP AND CVP



Description of the Project

Since 1971, the Bureau and DWR have operated the CVP and SWP in a coordinated manner by means of annual letters of understanding, in which they have agreed to operate according to the terms of the 1971 draft COA, with modifications. Since the State Water Resources Control Board (State Board) issued its current water quality and outflow standards in Decision 1485 (1978), the annual letter has included an agreement that the two projects will operate to meet those standards.

The 1960 COA is insufficient as a guide to operations, and the 1971 draft supplemental COA is obsolete. The latter assumes eventual use of facilities that have not been constructed (e.g., Auburn Dam and Peripheral Canal), outdated demands on both the CVP and SWP, and Delta water quality objectives that only protected agricultural needs.

In 1979, the Bureau and DWR formed negotiating teams to reevaluate operating criteria, determine the water supplies available for each project, and develop a new COA. The draft was completed in December 1982.

The proposed COA would fill the need for a permanent agreement based on current project facilities, expected demands, revised Delta water quality standards, and a new sharing formula.

ACCOMPLISHMENTS

The proposed COA consists of 24 articles and three exhibits. It would have four main accomplishments:

1. Commit both the Central Valley Project and the State Water Project to meeting a single set of specified water quality and outflow standards for the Delta.

In executing the draft COA, the CVP and SWP would obligate themselves to meeting the Delta standards contained in exhibit A of the COA. The

Description of the Project

exhibit A standards are taken from Decision 1485 (D-1485), although certain standards for the Suisun Marsh have been omitted. According to D-1485, the Suisun Marsh standards are applicable only after 1984. These standards require a separate agreement with specially designed facilities for protecting the marsh.

No such agreement has been negotiated, although attempts have been made to negotiate agreements both on Suisun Marsh facilities and on fish and wildlife management in the estuary. These attempts may eventually lead to agreements. Meanwhile, execution of the proposed COA will not in any way jeopardize opportunities to obtain agreement on matters beyond its limited scope.

2. Establish mutually recognized annual water supplies of the two projects.

The COA establishes mutually recognized annual water supplies of the CVP and SWP--in exhibit B-1 for 1980, and in exhibit B-2 for 2020. These supplies were computed using mathematical procedures wherein the operational capabilities of the two projects are superimposed on sets of conditions representing a level of development (year), demand for water from the projects, and historically occurring hydrology modified to reflect the level of development.

By quantifying water supplies, exhibits B-1 and B-2 (particularly B-2) may represent a step in the direction of allowing the CVP to enter new contracts. If the CVP is to realize its full year 2020 water supply, it will have to make new contracts and serve new areas. However, the connection between the new COA, including its exhibits, and any potential new contracts is tenuous. First, the new COA is not a prerequisite to such contracts; new CVP contracts may be signed with or without a new

Description of the Project

COA. Second, exhibit B-2 is included in the new COA more to establish the positions of the parties to the COA than to indicate a physical presence of contractable water. Whatever water is physically available in the system is available regardless of the COA. Third, the new COA would not trigger any new contracts; each contract would be a separate and independent action subject to studies on water availability and environmental impact.

3. Establish a new sharing formula.

The old agreement had a complicated formula for calculating shares of exportable unstored flow, but the SWP was usually entitled to 60 percent. The new sharing formula of the proposed COA is based on the 1980 level study and is really two formulas for two different situations that occur during balanced water conditions. One formula apportions the responsibility for making storage withdrawals to supply in-basin uses when flow other than from storage withdrawals (unstored flow) is insufficient to provide the full supply required to meet exhibit A standards and Delta exports. The formula for sharing this responsibility is:

Central Valley Project	75 percent
State Water Project	25 percent

The other formula defines the percentage entitlement of the two parties to store or export water when unstored flow is available in excess of in-basin use requirements (including exhibit A). The formula for sharing this water is:

Central Valley Project	55 percent
State Water Project	45 percent

The formulas are applied on a daily basis. The new formulas are more fair and workable to both the CVP and SWP than the old formula.

4. Firm up arrangements for wheeling.

Sometimes one or the other project needs to have some of its water conveyed ("wheeled") in facilities of the other project. Article 10 of the new COA provides an arrangement to cover wheeling in certain situations. These situations occur during outages in the facilities of either project and whenever the CVP has had to curtail export pumping at the Delta per exhibit A requirements to minimize diversion of young striped bass during May and June.

Under Article 10, wheeling can be done on a more certain and reliable basis because compensation for the wheeling party is already negotiated and determined.

ALTERNATIVES

There are three possible no-action alternatives to the proposed COA. From the viewpoint of impacts to endangered species, the difference between the COA and no action concerns the Delta water quality and outflow standards in exhibit A of the proposed COA. Exhibit A standards are the same as D-1485 except that Suisun Marsh standards have been eliminated.

With a no-action alternative, the Bureau could decide in any year, in the absence of an executed COA, not to meet the State standards for the Delta. The Bureau would still be obligated to meet the CVP's own standards for the quality of water pumped at the Tracy Pumping Plant in the southern Delta. These "Tracy standards" are contained in the Bureau's contracts with users of water from the Delta-Mendota Canal. The contracts require that salinity of the canal water in milligrams of dissolved solids per liter average no more than 450 annually, 600 monthly, and 800 daily.

Description of the Project

Evaluation of the no-action alternative is based on an assumption that in certain critical years the Bureau would operate the CVP to meet only the Tracy standards, rather than those of exhibit A. Critical years are unusually dry years. About 1/10 of the historical water years for which good records are available have been dry enough to be considered critical by the most commonly used standard, the Four Rivers Index; however, the assumption that the Bureau would operate for Tracy standards was made only for critical years in which the Bureau would have to impose water supply deficiencies on CVP contractors. Most, but not all, of the historical critical years were that dry.

The following are the three alternatives to the COA. These are summarized in table 1.

No Action, Case A

Both the CVP and SWP would be operated to meet only the CVP's Tracy standards in the Delta. Delta outflow requirements would be reduced in critical years, allowing the CVP and SWP to retain more water in their reservoirs.

No Action, Case B

The CVP would be operated to meet Tracy standards, while the SWP would be operated to make the same contribution of water for the Delta as it would with the proposed COA. The increase in SWP reservoir storage observed in Case A would be eliminated as the SWP releases its share of the storage increase to maintain Delta standards.

No Action, Case C

The CVP would be operated to meet Tracy standards and the SWP would be operated to fully meet the exhibit A standards, contributing all the

Table 1

CONCEPTUAL COMPARISON OF CRITICAL YEAR OPERATIONS,
PROPOSED ACTION VERSUS NO ACTION

<u>Alternative</u>	<u>Storage</u>		<u>Export</u>		<u>Delta Outflow</u>
	<u>SWP</u>	<u>CVP</u>	<u>SWP</u>	<u>CVP</u>	
Proposed Action	0	0	0	0	0
No Action					
Case A	+	+	0	0	-
Case B	0	+	0	0	-
Case C	0	+	-	0	0

EXPLANATION:

- 0 = No Change from Proposed Action.
- + = Increase from Proposed Action.
- = Decrease from Proposed Action.

- Case A -- CVP and SWP meet Tracy standards.
- Case B -- CVP meets Tracy standards;
SWP releases its share of Exhibit A.
- Case C -- CVP meets Tracy standards;
SWP meets Exhibit A in full.

Description of the Project

extra water required, including that which would be the CVP share under the proposed COA. The SWP would have to reduce its export pumping from the Delta.

LISTED SPECIES

LANGE'S METALMARK BUTTERFLY

Lange's metalmark butterfly (Apodemia mormo langei) is endemic to two sand dune sites east of Antioch in Contra Costa County. This species is restricted to sand flats and dune remnants where the larval plant food Eriogonum latifolium ariculatum occurs. There is no evidence that the metalmark had a broader distribution. The U.S. Fish and Wildlife Service purchased 55 acres of dunes to protect the metalmark, as well as the Contra Costa wall flower and Antioch Dunes evening primrose.

VALLEY ELDERBERRY LONGHORN BEETLE

The valley elderberry longhorn beetle, Desmocerus californicus dimorphus (VELB), has been collected only along the Lower American River, along Putah Creek at Lake Solano and below Monticello Dam, and near Delhi, Merced County. The occurrences along the American River are Bushy Lake, C. M. Goethe Park, Johnson Industrial Park, Ancil Hoffman Park, and Rossmoor and Sacramento Bars of the Lower Sunrise Recreational Area. The beetles probably occur in other areas, but field data are limited. There is a high probability that they occur all along riparian areas from Goethe Park to Johnson Industrial Park (Eng, pers. comm.).

The beetle requires elderberry bushes (Sambucus ssp.) throughout its life cycle. Elderberry thickets occur in moist oak woodlands and flood plains near rivers.

Adult beetles may be found from mid-March to early June. Eggs are deposited in cracks and crevices of living elderberry bushes. Larvae

Listed Species

bore into and feed upon the pith of larger stems and roots. The larvae also pupate in the pith. Adults emerge while the elderberries are in flower in April or May. The life cycle requires 2 years (Eya, no date; Kobetich, 1982).

ALEUTIAN CANADA GOOSE

The Aleutian Canada goose (Branta canadensis leucopareia) breeds only on Buldir Island in the Aleutian Islands. Their breeding grounds in the western Aleutian Islands were heavily impacted by the introduction of Arctic foxes. The wintering range extended at one time to Japan and from British Columbia to northern Mexico. They now mainly winter in California, although some geese have migrated to the Lower Colorado River Valley of Arizona and Mexico (Springer et al., 1978).

Aleutian Canada geese tend to be site-specific in their fall and winter areas in California. The major use areas are the north coast near Crescent City, the Butte Sink and Colusa areas, and the upper San Joaquin Valley. These geese feed in harvested fields, rice stubble, green barley, flood-irrigated and nonirrigated pastures. They roost in ponds and flooded fields (Woolington et al., 1979; Beall, 1980).

The California Fish and Game Commission established hunting closure zones for this species in Del Norte and Humboldt Counties, and parts of Glenn, Sutter, Butte, Colusa, San Joaquin, Stanislaus, and Merced Counties. These closure zones have been effective in protecting the species.

The Sacramento-San Joaquin Delta is not a major use area for the Aleutians, although they have occasionally been sighted in the Delta. These are considered wandering individuals or incidental groups passing

Listed Species

through. Grizzly Island received regular use in 1975-1978, but sightings have been infrequent since then (Yparraguirre, 1978; Beall, 1980).

BALD EAGLE

The bald eagle (Haliaeetus leucocephalus) occurs throughout North America from the Arctic to the Gulf of Mexico. In California, it breeds in northern California mountains in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity Counties. Nests are usually constructed in tall conifers near reservoirs or other bodies of water. Bald eagles winter nearly Statewide near reservoirs, lakes, and rivers. They feed mainly on dead or dying fish and waterbirds. At times, carrion and small mammals are taken.

In the COA area, bald eagles nest near Shasta Lake, Whiskeytown Lake, and Clair Engle Lake (Thomson, 1974). They winter near Shasta Lake, Whiskeytown Lake, Lewiston Reservoir, Clair Engle Lake, Lake Oroville, Folsom Lake, San Luis Reservoir, and the Sacramento River (Detrich, 1981, 1982).

In the past, populations of bald eagles declined dramatically due to DDT toxicity, human disturbance at nest sites, and a reduction in the number of suitable nest sites. Current preservation programs for this species include protection of nest sites by public land managers, management of nesting territories for old growth solitary trees, and the banning of DDT use.

AMERICAN PEREGRINE FALCON

The American peregrine falcon (Falco peregrinus anatum) occurs from Alaska south to Baja, California, and east to southeastern United States.

Listed Species

In California, the peregrine nests in the north and central Coast Ranges and the Sierra Nevada and Cascade Ranges. Nesting sites are protected ledges on high inland cliffs and sea cliffs. Peregrines winter through most of the nondesert areas of the State. Coastal and inland marsh and riparian areas are important areas for feeding.

By 1969, pesticide contamination, habitat change, illegal shooting, and illegal falconry activities reduced the number of active nests to less than 10 in California. The number of breeding pairs has increased to over 40 due to the banning of DDT use, habitat protection, and nest surveillance.

CALIFORNIA CLAPPER RAIL

The California clapper rail (Rallus longirostris obsoletus) is a permanent resident of salt marshes adjacent to San Francisco, San Pablo, Southhampton, and Suisun Bays and Elkhorn Slough. Diking, filling, or conversion to salt evaporation ponds has eliminated much of the salt marshes inhabited by the rails. Industrial pollution and predation by introduced rats have also reduced rail populations.

Rails inhabit salt marshes dominated by pickleweed and cordgrass. They construct nests near tidal sloughs. Although pickleweed was the main component of nests found in one study, most nests were within the cordgrass zones of South San Francisco Bay marshes. Furthermore, several other studies found much higher summer densities of rails in cordgrass than in pickleweed (Shellhammer and Harvey, 1982).

Suisun Marsh was originally a brackish marsh unsuitable for clapper rails. Clapper rails recently inhabited parts of the marsh evidently due to changes in vegetation due to increased salinity (Shellhammer and Harvey, 1982).

Listed Species

SALT MARSH HARVEST MOUSE

The salt marsh harvest mouse (Reithrodontomys raviventris) is restricted to scattered, discontinuous salt marshes bordering San Francisco, San Pablo, and Suisun Bays. Destruction of salt marshes by land filling and diking has greatly reduced and fragmented the area originally occupied. These mice are dependent on dense cover usually with a high percentage of pickleweed. Brackish marshes dominated by alkali bulrush do not support the mice, although complex brackish marshes composed of rushes, cattails, and pickleweed do support the mice if there are pure stands of pickleweed (Shellhammer and Harvey, 1982). Suisun Marsh is intensively managed for waterfowl, reducing its value for the mice. The mice are probably not abundant in the marsh, as compared to other areas where they occur, due to the prevalence of alkali bulrush (Shellhammer, 1980).

CONTRA COSTA WALLFLOWER

The Contra Costa wallflower (Erysium capitatum var. angustatum) occurs only in remnant sand dunes near Antioch, Contra Costa County. It is restricted to more or less consolidated dunes and loose sand areas. It grows mainly along the river frontage and some dune slopes at 1.5 to 27 meters in elevation. No plants occur more than 100 meters inland (Gordon, n.d.).

Habitat has been destroyed due to industrial expansion, ORV use, and plowing for fire protection. The FWS purchased 55 acres of dunes to protect the wallflower, as well as the Lange's metalmark and Antioch Dunes evening primrose.

Listed Species

ANTIOCH DUNES EVENING PRIMROSE

The Antioch Dunes evening primrose (Oenothera deltoides howellii) occurs in the same locality and has similar habitat requirements as the Contra Costa wallflower. The primrose has also been introduced at Brannan Island State Park.

CANDIDATE SPECIES

CALIFORNIA FRESHWATER SHRIMP

The California freshwater shrimp (Syncaris pacifica) occurs in five freshwater streams in Marin, Napa, and Sonoma Counties. This species has been extirpated from at least five other localities. Reasons for decline include habitat destruction and water diversion.

SALT MARSH YELLOWTHROAT

The salt marsh yellowthroat (Geothlypis trichas sinuosa) breeds in freshwater marshes of San Francisco and San Pablo Bays and on the central California coast from southern Sonoma County to San Mateo County. This species winters in marshes (preferably near salt or brackish water) from San Francisco Bay to San Diego.

Salt marsh yellowthroats require a dense growth of marsh vegetation and associated high densities of insects used for food. They occur in three habitat types: woody swamps dominated by willows; brackish marshes with baccharis, Rumex spp., grasses, cattails (Typha spp.), and tules (Scirpus spp.); and freshwater marshes with cattails, grasses, and herbs (Foster, 1977).

The major reason for the decline of salt marsh yellowthroats is the destruction of salt and freshwater marsh habitat by diking, draining, and pollution. Channelization, diversion, and pollution of the lower reaches of some streams may have blocked dispersal of these birds from wintering to breeding areas. Foster (1977) estimated a total of 158 to 165 breeding pairs in 13 marshes and swamps in the San Francisco Bay area.

Candidate Species

CALIFORNIA BLACK RAIL

The California black rail (Laterallus jamaicensis coturniculus) presently occurs in salt marshes from Marin County to San Diego County (including the San Francisco-San Pablo Bay area) and in inland freshwater marshes in the Sacramento-San Joaquin Delta and Imperial County. Destruction of wetlands by filling and draining has reduced its habitat.

TRI-COLORED BLACKBIRD

The tri-colored blackbird (Agelaius tricolor) occurs throughout the Central Valley, coastal areas south of Sonoma County, and the Modoc Plateau. It is a year-round resident in most of its California distribution. Tri-colored blackbirds breed in freshwater marshes. The marshes usually occur in rice fields and pasturelands. In the fall and winter, the birds leave the marshes and wander around agricultural lands.

The populations of tri-colored blackbirds have been decreasing. Those in the Central Valley may have been reduced by more than 50 percent (Dehaven et al., 1975). The major reasons for population declines are disturbance of nesting colonies by airplanes spraying rice fields to control weeds and elimination of marsh habitat (USFWS, n.d.).

CALIFORNIA YELLOW-BILLED CUCKOO

The California yellow-billed cuckoo occurs in scattered areas in California along the Sacramento, Feather, South Fork Kern, Santa Ana, Amargosa, Owens, and Colorado Rivers. This species also occurs in British Columbia, Washington, Utah, Colorado, and Texas south to Mexico. In North America, cuckoos are summer residents and nest in riparian vegetation or orchards adjacent to streams. They arrive in California in late May and

Candidate Species

leave for their Central or South American winter range in September. Large insects are the preferred food (Layman, 1980).

Agricultural and urban development and irrigation projects have destroyed large amounts of riparian vegetation. Within the remaining small tracts of riparian habitat, flood control has decreased the amount of early successional stage vegetation required by the cuckoos (CDFG, 1980).

Several parcels of riparian habitat have been protected from development. The California Wildlife Conservation Board purchased over 700 acres along the Sacramento River and 1,300 acres along the Santa Ana River. The Nature Conservancy purchased 1,500 acres along the South Fork Kern River.

LEAST BELL'S VIREO

The least Bell's vireo (Vireo bellii pusillus) originally occurred in the Central Valley, interior valleys of the central and southern coast ranges, and in desert oases. The distribution of this species has become restricted to scattered riparian areas in southern California. Destruction of habitat and cowbird parasitism are thought to be the major reasons for the decline of the least Bell's vireo (Goldwasser et al., 1980).

SHASTA SALAMANDER

The Shasta salamander (Hydromantes shastae) inhabits limestone outcrops near Shasta Lake below the 3,000-foot elevation. They are found in moist limestone fissures and caves in the dry season, and under rocks and logs in the winter. Most populations are in Shasta-Trinity National Forest and will be protected by a management plan.

Quarrying of limestone has destroyed most of one of the Shasta salamander sites on private land. The range of this species may have been larger before the formation of Shasta Lake (Bogener and Brouha, 1979).

Candidate Species

SWAINSON'S HAWK

The Swainson's hawk (Buteo swainsoni) mainly breeds in California in the Central Valley and the Klamath Basin. There are a few scattered breeding sites elsewhere in the State. The total range of this species extends from Alaska across to western Manitoba and south to Baja, California, and Arizona.

Swainson's hawks in California nest in isolated trees near grasslands, irrigated pastures, and open fields of crops. In the Central Valley, 83 percent of these hawks nested within 1 mile of riparian zones (Bloom, 1980). They leave California in the fall for wintering areas in Central and South America.

The population of Swainson's hawks in California was estimated to have declined by 91 percent from historical times (Bloom, 1980). The reasons for this decline are not clear. Conversion of California habitat to farmland and loss of riparian areas may have affected this species. However, some habitat used by this species is still intact, yet is unoccupied. Insecticide contamination and/or habitat destruction in wintering grounds in Latin America may also be contributing to the decline.

SUISUN ASTER

The Suisun aster (Aster chilensis var. lentus) is only known from Hill Slough in Solano County and from the water's edge at the Antioch Dunes. It grows in tidal streams and among tules in marshy areas (Niehaus, 1977a).

Originally abundant along tidal streams in the Suisun Marsh, the distribution of the Suisun aster has apparently been reduced due to drainage and filling of marsh habitat, pollution, and changes in salinity levels. The purchase of the Antioch Dunes by the FWS has protected this species from habitat destruction of the dunes.

Candidate Species

CALIFORNIA HIBISCUS

The California hibiscus (Hibiscus californicus) occurs around the lower portions of the Sacramento and San Joaquin Rivers in Contra Costa and San Joaquin Counties and north to Butte and Glenn Counties. It grows in moist, freshwater-soaked riverbanks and low peat islands in sloughs.

Niehaus (1977b) suggested that the California hibiscus may depend on a certain fresh/slight-saltwater mixture from the freshwater rivers and water from the San Francisco Bay. Weed control and public works improvements may have adversely affected this species.

DELTA TULE-PEA

The Delta tule-pea (Lathyrus jepsonii spp. jepsonii) occurs from the Napa River east through Suisun Marsh to Stockton and north to Brennan Island in Sacramento County. It grows on drier ground in marshes. Niehaus (1977c) suggested that changes in salinity of marsh waters or their drainage would affect and perhaps destroy habitat for the Delta tule-pea.

MASON'S LILAEOPSIS

The Mason's lilaeopsis (Lilaeopsis masonii) occurs in the Sacramento-San Joaquin Delta. It grows in mudflats and along river margins, where it is often inundated by wave and tidal fluctuations. Its former habitat has been reduced.

VALLEY SAGITTARIA

The valley sagittaria (Sagittaria sanfordii) occurs mainly in the Central Valley with disjunct populations in Del Norte and Santa Barbara Counties. It grows in freshwater in shallow ponds and ditches. One of the

Candidate Species

existing populations occurs near Sacramento in a small oxbow pond of the Sacramento River. Agricultural development has eliminated many populations of this species (Turner, pers. comm.).

IMPACTS

INTRODUCTION

Environmental consequences of the proposed COA and the no-action alternative were compared with the aid of computer simulations of project operations. Such simulations are commonly called operation studies. Operation studies require detailed sets of input data. Such data sets were available for the 1980 and 2020 "levels of development." The "level of development" concept has to do with demand for water, not with development of project facilities.

Operation studies were performed for the 1980 level of development to approximately represent the present and for the 2020 level of development, which is considered "ultimate" for planning purposes. In both sets of studies, only presently existing project facilities were assumed in place. The 1980-level studies were based on observed historical hydrology for the period October 1921 to February 1979. The 2020-level studies were based on observed and estimated hydrology for the period October 1894 through February 1971. The differing periods were used because work on operation studies was split between DWR and the Bureau, and each agency has its own computer model. DWR performed the 1980-level studies, and the Bureau performed the 2020-level studies.

Although 57 years of operation were simulated in the 1980-level studies and 77 years in the 2020-level studies, only the years classed as "critical" occasioned any difference in operation between the proposed action and the no-action alternative. In the 1980-level studies, these years (always March

Impacts

to February) were 1924-25, 1931-32, 1932-33, 1933-34, 1934-35, and 1977-78. In the 2020-level studies, the critical years were 1924-25, 1928-29, 1931-32, 1933-34, and 1934-35.

As an example of the studies, appendix 1 is the results of the operation studies at the 2020 level for Delta outflow.

PROPOSED ACTION

Listed Species

Lange's metalmark butterfly. The COA would not increase areas of the Antioch Dunes flooded by the San Joaquin River and therefore would not affect this species. As shown in attachment 1, there would be a difference in Delta outflow between D-1485 and Tracy standards for some months during 10 dry years out of 77 historical years at the 2020 level. While D-1485 would increase outflow for most of the months, the outflows would be less than for comparable flows during nondry years. Effects at the 1980 level would be proportionally the same.

Valley elderberry longhorn beetle. The COA would not affect riparian habitat along the lower American River and therefore not affect this species. At the 1980 level of development, the COA would, on an average monthly basis, increase flows in 22 out of 600 months and decrease flows in 9 out of 600 months. At the 2020 level, only 6 out of 600 months would differ from no action. The increased flows due to the COA would be less than maximum winter flows in all years.

Aleutian Canada goose. Marsh vegetation at Grizzly Island and areas in the Delta occasionally used by this species would not change (see the section below on the California clapper rail). During critical dry years, D-1485 standards would maintain higher quality water used for Delta

Impacts

agriculture than for no action during these years. Crop yield would not be reduced, and Aleutian Canada geese would still be able to feed in the Delta. There would be no change in harvested fields or wildlife management areas near Colusa used by the Aleutians.

Bald eagle. Impacts of the COA to the bald eagle would depend on impacts to reservoir and Sacramento River fisheries. Since bald eagles in the Pacific Northwest mainly feed on dead and injured fish, any change in the availability of fish could affect the nesting and winter populations of bald eagles.

The effects on reservoirs were analyzed by: (1) Using regression equations to estimate total standing crop (TSC) and sport fish harvest (SFH), (2) comparing actual differences in water-level elevations, (3) comparing the relative differences in water-level fluctuation, and (4) comparing the minimum reservoir volumes expected under the two standards.

The regression equations were developed and used by the U.S. Fish and Wildlife Service (USFWS) to determine relative differences in TSC and SFH for years in which the projected water volumes of the reservoirs differed for D-1485 and Tracy standards (USFWS, 1983). The results showed no significant difference between the two standards (tables 2 and 3). The only variable that differed in these calculations was water volume. Since other factors may affect fish, the other three comparisons mentioned above were done.

Compared to water levels under no action, Lake Shasta would have significantly lower water levels during the centrarchid spawning period (March-June) for 2 years of the 77-year historic period used for the 2020 level of water development. Lower levels could reduce the littoral zone and thus

Impacts

reduce spawning habitat. A reduction in warmwater fish during these years could reduce the prey base for bald eagles. However, the production of eagles in the breeding season could be enhanced. The extreme drawdown of Shasta Lake in 1977 apparently increased bald eagle productivity around the lake. According to Detrich (1977), bald eagles were quite successful in foraging during the 1977 nesting season as indicated by a high number of young successfully fledged. The fish population was concentrated due to the decreased water volume. There did not appear to be a large increase in fish mortality, although all dead fish were concentrated in a smaller area. Any increase in mortality would have increased the prey base for the bald eagles.

As the lake levels decreased, "delta" areas were created on tributary streams due to exposure of beds of sediment. These deltas exposed fish as they crossed the deltas. Any dead or dying fish were also easily spotted as they were carried down the streams. Bald eagles were observed foraging at these deltas. The lowered water levels may also have created buffer zones between nests and human recreation.

Detrich speculated that the extreme drawdown may have adversely affected bald eagles by creating new access to some nests by vehicles, increased the distance and elevation of carrying fish from water to nests, and the possible abandonment and relocation of a nest territory due to loss of water near the nest. However, it appears that the positive impacts outweighed the negative impacts because the productivity of the bald eagles increased.

For wintering bald eagles, during the theoretically 2 out of 77 years with a severe drawdown, coldwater fish could be eaten as well as the reduced supply of warmwater fish.

Impacts

Lake Oroville would have significantly lower water levels during the centrarchid spawning period for 5 years out of the 55-year historic period used for the 1980 level, and 3 years out of the 2020 level of water development.

Reduced volumes of Folsom Lake and Lake Oroville could also affect fisheries at the 1980 level of development. The proposed actions would not change the impacts to Folsom because both D-1485 and Tracy standards would result in critically low volumes in 1 year out of 57 years. At Oroville, the proposed action would cause critically low volumes in 2 years out of the 77 years, compared to 1 year for Tracy standards. These low water volumes could cause major kills of salmonids in the summer, reducing the number of salmon and trout fish which would die in the winter and be eaten by wintering bald eagles.

During several critical years, the lower water levels and reduced volumes at Oroville could reduce both coldwater and warmwater fish used by bald eagles in the winter.

Water-level fluctuations of about 20 feet during the centrarchid spawning period could severely harm spawning, nesting, and rearing these fish. In nearly all cases, both D-1485 and Tracy standards would show extreme levels of fluctuations, although D-1485 fluctuating would be larger. In their input into the COA EIS-EIR, the USFWS (1983) concluded that the net impact to the fishery from fluctuations is essentially identical for each standard. The timing of the fluctuations is currently not known and therefore no firm conclusions can be drawn. If water levels are relatively stable for 3 out of the 4 week spawning period, impacts would be minimized.

Impacts

During critically dry years (2 years out of 77), the COA would significantly reduce the survival of runs of chinook salmon in the Sacramento River. Lower Shasta Lake storage levels would cause warmer Sacramento River temperatures in critical dry years only from June to November. This would increase mortality of salmon eggs and alevins. Increased temperatures would also cause advanced maturation of female salmon spawners, resulting in increased adult prespawning mortality. Egg mortality is estimated as follows:

<u>Run</u>	<u>Level of development</u>	<u>Mortality of salmon eggs</u>
Winter-run eggs, alevins	1980	3-20% mortality
	2020	13-70% mortality (depending on month)
Spring-run eggs	1980	10-20%
	2020	30-67%
Fall-run eggs	1980	2-3% mortality
	2020	30-67% (October)
		5-10% (November)

These impacts only occur in critically dry years and only affect salmon and steelhead trout; other fish in the river would not be affected by the COA and thus could be preyed upon by bald eagles. While salmon are the most important food item in the Upper Sacramento River drainage (Detrich, 1978), bald eagles do not feed exclusively on salmon.

In a report on the Cottonwood Creek Basin, Monroe (1983) stated that bald eagles may feed on other fish such as the Sacramento sucker, Sacramento squawfish, carp, catfish, smallmouth bass, sunfish, and trout. Salmon become scarce when eagles migrate northward from February to April or early May. Eagles increase their use of other fish at this time.

Impacts

Bald eagles in Tehama County have fed on dead sheep, especially when salmon were scarce (Detrich, 1978). At Eagle Lake in Lassen County, western grebes and coots were the dominant prey (Thelander, 1973).

In summary, it is believed that the COA would not affect the bald eagle. In critically dry years, there could be a reduced prey base at Shasta Lake, Lake Oroville, and the Sacramento River in the winter. It is possible that there would not be enough food for all the eagles which currently winter at these lakes. However, bald eagles are quite mobile and individuals may use more than one wintering area (U.S. Forest Service, 1977).

As discussed above, alternate food sources are available. Studies of stomach contents of bald eagles have shown that they eat whatever is plentiful (U.S. Forest Service, 1977). Even if the wintering population at Shasta Lake, Lake Oroville, and the Sacramento River were reduced in critically dry years, these years occur so seldom that the bald eagle population should quickly rebound.

Because the above impacts to fish occur in critically dry years, do not affect all fish species, and other food sources should be available, the COA would not affect the bald eagle.

American peregrine falcon. The COA would not affect the peregrine falcon. There would be no changes in riverflows and therefore no changes in riparian areas used for feeding. The productivity of marshes used for feeding would also not change.

California clapper rail. Impacts of the COA to the clapper rail would depend on whether or not the project would change salinities in the Bay-Delta region enough to alter the habitat of this species.

Table 2. Comparison of total standing crop (TSC) and sport fish harvest (SFH) expected under the proposed action (D-1485) and the alternative (Tracy) at the 1980 level of development. All values are in pounds/acre.

Years Considered	FOLSOM		OROVILLE		SHASTA		CLAIR ENGLE	
	TSC	SFH	TSC*	SFH	TSC	SFH	TSC*	SFH
	D-1485	Tracy	D-1485	Tracy	D-1485	Tracy	D-1485	Tracy
All Years								
1922-1978	94	52		52	103	104		42
Critical Years								54
1924-1927	101	53		53	104	104		42
1931-1935	--	--		--	--	--		--
1931-1937	98	52		56	109	107		43
1977-1978	108	54		55	111	110		44
								55
								61
								--
								57
								56

* Equation not applicable

Table 3. Comparison of total standing crop (TSC) and sport fish harvest (SFH) expected under the proposed action (D-1485) and the alternative (Tracy) at the 2020 level of development. All values are in pounds/acre.

Years Considered	FOLSOM		OROVILLE		SHASTA		CLAIR ENGLE	
	TSC D-1485	SFH D-1485	TSC* D-1485	SFH D-1485	TSC D-1485	SFH D-1485	TSC* D-1485	SFH D-1485
All Years								
1894-1971	99	40	103	51	103	42	54	54
Critical Years								
1919-1921	--	--	103	--	102	42	--	--
1923-1925	--	--	111	--	111	44	--	--
1923-1927	--	--	--	53	--	--	--	--
1923-1936	109	41	--	--	--	--	--	--
1928-1936	--	--	113	--	105	44	--	--
1929-1936	--	--	--	54	--	--	--	--
1929-1938	--	--	--	--	--	--	--	56
1938-1941	--	--	108	--	106	43	--	--

*Formula not applicable

Impacts

In all years except critically dry years, there would be no significant changes in Delta water quality correlated to Delta outflow. For the 2020 level, the monthly outflows are within 2 percent with or without the COA. Outflows at the 1980 level would also be similar. In the 6 critically dry years out of a total of 77 years for the 2020 level, the COA would increase Delta outflow by about 7 percent (see attachment 1). The above occasional changes in salinity would have no effect on the vegetation. According to the final Environmental Impact Report (EIR) on D-1485 (California State Water Resources Control Board, 1978), D-1485 without immediate implementation of the Suisun Marsh protection plan (the "recommended plan" or "Alternative IV" in the EIR) provides essentially the same level of protection to the marsh as "no action." Protection of the marsh was defined as preventing increased salinities. Increased salinities are bad for waterfowl because low salinities are required for alkali bulrush, the major food of wintering waterfowl. Increased salinities are thought to have extended the range of the clapper rails in Suisun Marsh (Shellhammer and Harvey, 1982). On the other hand, increased salinities may also reduce tules and cattails in some sloughs which provide habitat for clapper rails (Wernette, 1981). Because the COA would implement D-1485, the COA would not affect the California clapper rail in Suisun Marsh.

The COA would also not affect clapper rail populations in San Francisco Bay. Monthly and annual Delta outflows with and without the COA are close enough in magnitude that flushing of the Bay would not be significantly affected. Hydrologically related processes, including sedimentation, saltwater intrusion, and circulation, should continue as currently exists. In critically dry years, slightly more water would flow through the Bay.

Impacts

Since these conditions occur at the 2020 level in about 6 out of 77 years, there would be no change in rail habitat.

Salt marsh harvest mouse. The COA would not affect the salt marsh harvest mouse for the same reasons discussed for the California clapper rail.

Contra Costa wallflower. The COA would not affect this species for the same reasons discussed for the Lange's metalmark butterfly.

Antioch Dunes Evening Primrose. The COA would not affect this species for the same reasons discussed for the Lange's metalmark butterfly.

Candidate Species

California freshwater shrimp. The COA would not affect this species since it inhabits freshwater streams which are not influenced by the Bay-Delta area or other COA areas.

Salt marsh yellowthroat. The COA would not affect this species for the same reasons discussed for the California clapper rail.

California black rail. The COA would not affect this species for the same reasons discussed for the California clapper rail.

Tri-colored blackbird. The COA would not affect freshwater marshes or agricultural lands in the Central Valley used by the tri-colored blackbird. Habitat in the Delta marshes would not change, as discussed for the California clapper rail.

Yellow-billed cuckoo. In the Sacramento River, the COA would slightly increase spring flows and occasionally reduce flows during periods of high releases from Lake Shasta. In the Feather River, the COA would increase spring flows mainly in critical dry years. These changes would not adversely affect riparian habitat in these rivers used by the yellow-billed cuckoo.

Impacts

Least Bell's vireo. This species has been extirpated from the project area and therefore would not be affected.

Shasta salamander. The COA would not increase the level of Lake Shasta and therefore would not affect this species.

Swainson's hawk. The COA would not affect riparian areas near the Sacramento River as discussed for the yellow-billed cuckoo and therefore would not affect this species.

Suisun aster. The COA would not affect the Antioch Dunes population of the Suisun aster because the areas flooded by the San Joaquin River would not increase. The Hill Slough population would not be affected because the D-1485 standards without the Suisun Marsh protection plan would not affect Suisun Marsh near Hill Slough.

California hibiscus. D-1485 standards are designed to reduce unnatural saltwater intrusion and make the water quality regime of the Bay-Delta area to more closely correspond to hydrologic and ecologic conditions that would exist in the absence of the SWP and CVP. This species is generally a freshwater species and improved water quality conditions could enhance its habitat. However, there probably would not be any effect since Delta outflow would be enhanced mainly in critical dry years.

Delta tule-pea. The COA would not affect this species for the same reasons given for the Suisun aster.

Mason's lilaeopsis. This species is associated with the Suisun aster, but is more widespread (CDFG, 1979). There would be no effect on this species, as described for the Suisun aster.

Valley sagittaria. The COA would not affect freshwater ponds and ditches in which this species occurs. The slightly increased spring flows

Impacts

of the Sacramento River and occasional reduced flows would not reduce the oxbow pond in the Sacramento River where a population of this species occurs.

ALTERNATIVES

No Action, Case A

At the 2020 level of water demand, Delta outflow in critical dry years would be lower than for the proposal. Slightly higher salinities in critical dry years would result, temporarily making brackish marshes more saline and fresh marshes more saline. These would temporarily benefit harvest mice, black rails, and some clapper rails, and be adverse to yellowthroats and some clapper rails. There would be no overall change in the marsh habitat due to Case A since critical dry years historically occurred in only 6 out of the 77 years of study. The 1980 level would be proportionally the same.

Case A would not affect the above species in San Francisco Bay because flushing of Bay water is similar with and without D-1485.

Aleutian Canada geese which use Grizzly Island and other Delta areas would not be affected because marsh vegetation in the Delta would not be changed. Salinity advances up the estuary would increase salinity in irrigation water used in Delta agriculture. This would lower crop yields, but only in critically dry years. Because growers might change the type of crops grown to maintain productivity, there would be no effect on Aleutians which feed in this area.

Case A would not change flows of the Lower American River and therefore not affect the valley elderberry longhorn beetle.

Impacts

Case A would not change flows of the Sacramento and Feather Rivers and therefore not affect the Swainson's hawk and yellow-billed cuckoo.

Case A would not change water level elevations on Lake Shasta or Lake Oroville. Thus, the warmwater fishery would not be affected and therefore the prey base for the bald eagle would not change.

Case A would reduce the volume of Folsom Lake during 1 critical year out of 57 years for the 1980 level of development, the same as for the proposed action. Case A would reduce the volume of Lake Oroville for 1 critical year out of the 57 years, compared to 2 years for the proposed action. Effects on bald eagles would be the same as for the proposed action.

There would be no effect on the other species.

No Action, Case B

The effects of Case B on endangered species in the Delta would be similar to those described for the proposed action, but would be of a lesser magnitude because Delta outflow would be less in critical dry years. These would have no effect on San Francisco Bay species.

Flows of the San Joaquin River would not change and thus not affect the Lange's metalmark, Contra Costa wallflower, and Antioch Dunes primrose.

Flows of the American River would not change and thus not affect the valley elderberry longhorn beetle.

Case B would not affect the Swainson's hawk and yellow-billed cuckoo along the Sacramento River above the mouth of the Feather River because flows would not change. In the Feather River and the Sacramento River below the mouth of the Feather River, there would be increased spring flows mainly in critical dry years. These would not affect riparian habitat for the Swainson's hawk and yellow-billed cuckoo.

Impacts

Effects on the bald eagle at Lake Shasta and Folsom Lake would be the same as for Case A of the no-action alternative. Effects on bald eagles at Lake Oroville would be the same as for the proposed action.

Case B would not affect any of the other species.

No Action, Case C

The effects of Case C on endangered species in the Delta and San Francisco Bay would be the same as for the proposed action.

The effects on species at Lake Shasta, Folsom Lake, the lower American River, and the Sacramento River above the mouth of the Feather River would be the same as for Case A.

The effects on yellow-billed cuckoos and bald eagles at Lake Oroville, near the Feather River, and Swainson's hawk, near the Sacramento River, would be the same as for the proposed action.

Case C would not affect any of the other species.

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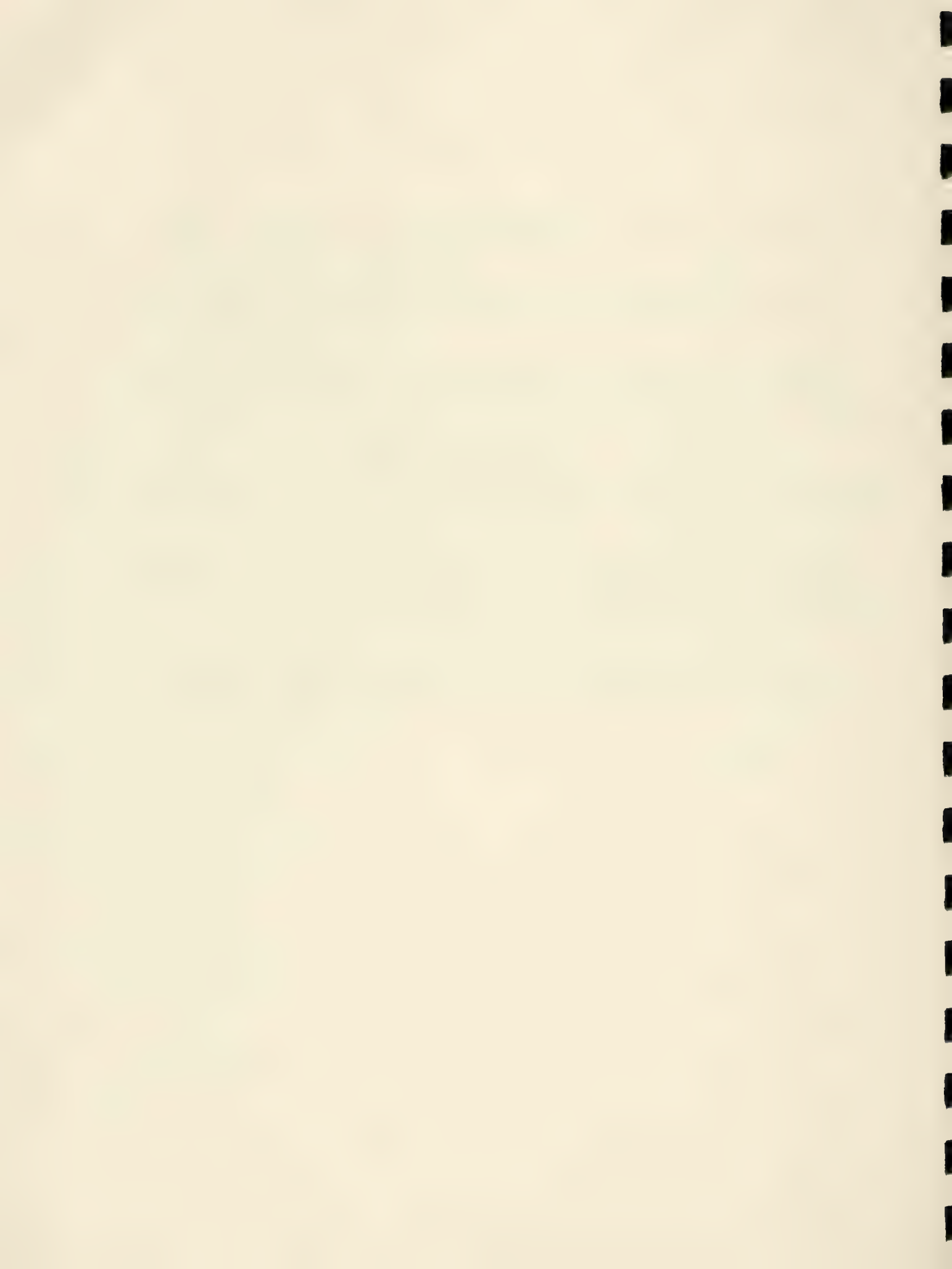
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ATTACHMENT 1

OPERATION STUDIES FOR
DELTA OUTFLOW, 2020 LEVEL



DELTA OUTFLOW, ELIAGE EXCEPT CRITICAL YEARS ARE TRACY STANDARDS
FLOW ARE FEAS. MONTHLY * 100'S OF CFS
COORDINATION AGREEMENT - CRITICAL YEARS BY 4 RIVERS INDEX NOVEMBER 23, 1983

YEAR	UCI	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
9425	42	45	927	1571	334	267	179	437	190	104	38	49	4643
9508	95	176	423	2045	843	363	103	70	69	66	52	49	4358
9607	41	18	58	295	555	969	510	137	107	81	46	48	2887
9795	41	36	59	96	81	51	22	45	38	34	36	34	577
9897	31	16	39	49	44	354	61	115	97	69	31	44	965
9905	259	29	103	535	930	241	853	274	142	104	41	51	3318
1	56	31	148	767	583	704	235	172	142	104	39	50	3299
102	41	41	619	444	190	417	120	276	153	164	34	50	2617
203	57	225	755	466	116	147	85	157	191	81	47	51	2276
304	71	74	117	330	1590	1043	1062	416	301	104	32	49	5229
405	102	179	323	897	162	143	118	234	271	104	33	51	2547
506	42	151	157	1210	1335	635	507	647	255	104	32	47	5211
607	46	354	664	258	1343	1456	555	645	395	104	31	44	5893
708	69	176	57	144	575	290	65	114	97	73	47	51	1776
809	42	45	695	1550	334	267	129	437	190	104	38	49	4390
910	74	135	169	407	943	904	230	172	142	104	39	50	3470
1011	42	45	137	1137	1335	635	474	647	255	104	33	47	4963
1112	47	157	19	237	472	83	92	65	48	45	42	49	901
1213	47	15	56	130	437	91	86	114	97	36	31	46	1216
1314	41	45	782	1571	934	264	150	437	190	104	33	49	4500
1415	55	176	465	2049	943	356	103	139	142	110	42	50	4550
1516	42	45	201	368	455	459	487	463	402	104	32	46	3127
1617	63	100	42	761	80	277	298	277	109	81	46	51	2138
1718	40	45	55	63	232	127	76	65	48	48	42	49	901
1819	42	45	66	61	54	111	264	305	140	81	45	51	1255
1920	57	121	42	113	276	164	74	66	33	35	43	36	1035
2021	28	165	641	483	202	359	133	275	153	104	35	50	2588
2122	40	171	148	80	465	310	156	396	179	81	38	47	2109
2223	40	144	373	247	109	52	197	108	97	69	31	44	1561
2324	41	15	55	53	36	71	54	45	39	34	34	32	538
2425	34	46	66	33	594	93	283	295	109	81	33	44	1531
2526	41	45	95	74	394	45	156	52	48	45	36	44	1025
2627	41	151	164	255	1377	350	451	268	142	104	39	51	3417
2728	41	126	101	101	273	972	180	103	57	66	39	44	2181
2829	41	15	56	53	82	36	25	45	38	34	34	32	531
2930	31	40	53	144	66	237	70	79	64	55	37	44	920
3031	41	15	64	54	54	41	37	45	38	34	34	32	519
3132	31	15	62	120	143	45	76	69	50	55	36	36	802
3233	25	44	44	62	51	31	76	56	27	34	34	32	502
3334	31	15	38	75	63	54	25	73	38	34	34	32	537
3435	31	15	38	247	55	233	397	180	197	91	33	41	1491
3536	45	15	55	294	1112	308	114	129	107	90	48	50	2404
3637	41	15	55	80	405	465	177	152	97	69	43	49	1626
3738	44	215	331	253	1291	1484	532	645	395	104	31	44	5569
3839	113	121	62	47	101	40	74	45	35	36	38	33	763
3940	31	15	39	267	333	979	527	153	124	104	39	48	2866
4041	41	15	423	977	1247	940	771	475	142	104	36	46	5154
4142	60	193	503	820	1137	215	191	398	214	104	32	44	4521

DELTA OUTLETS 11435 TRAPPT CRITICAL YEARS ARE TRACY STANDARDS
 FLOW ARE YEAR MONTHLY * 100'S OF CFS
 COOPERATION AGREEMENT - CRITICAL YEARS BY 4 RIVERS INDEX NOVEMBER 23, 1983

YEAR	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL		
4243	71	190	195	807	533	238	172	142	39	50	3495		
4344	46	45	33	127	232	76	65	48	47	47	904		
4445	42	76	67	77	539	236	133	97	37	48	1500		
4546	45	103	726	465	133	144	157	109	48	51	2153		
4647	41	45	93	117	81	65	48	39	48	48	735		
4748	41	45	56	75	206	309	166	81	36	48	1192		
4849	41	104	45	470	60	84	43	45	44	44	1104		
4950	41	45	55	114	97	138	97	69	31	44	1126		
5051	44	359	114	268	103	163	56	65	52	51	3646		
5152	45	129	443	640	591	658	371	104	31	45	4704		
5253	122	175	405	143	118	231	201	104	33	51	2645		
5354	42	217	60	429	343	135	107	81	47	51	2172		
5455	42	69	184	76	94	60	48	45	40	50	903		
5556	41	65	732	296	149	436	189	104	33	49	4489		
5657	96	171	79	397	62	192	97	69	47	51	1519		
5758	71	192	112	1063	1001	415	301	104	32	49	5408		
5859	84	174	59	83	89	65	44	45	36	44	1433		
5960	41	45	66	97	86	73	64	54	36	48	863		
6061	41	45	71	117	79	65	43	45	36	44	865		
6162	41	75	70	178	70	114	97	69	32	44	1352		
6263	265	92	179	254	867	273	142	104	34	50	3625		
6364	43	141	53	67	91	65	48	45	45	50	998		
6465	41	65	650	110	457	174	142	104	38	50	3269		
6566	41	187	71	158	182	94	81	54	52	51	1313		
6667	42	43	317	469	486	462	401	104	32	46	3309		
6768	75	135	57	299	65	73	61	59	52	51	1745		
6869	42	45	126	634	473	646	254	104	33	47	4778		
6970	86	179	424	356	183	70	59	70	53	50	4355		
7071	41	127	585	371	119	226	153	104	34	50	2413		
TOTAL	2741	4745	35271	17850	27080	33810	16495	18518	5093	10150	3561	2943	189687
AVERAGE	56	113	231	454	504	351	240	214	131	76	38	46	2463

DELTA OUTFLOW D1405 ONLY
 FLOWS ARE IN CFS MONTHLY * 100'S OF CFS
 COOPERATION AGREEMENT - CRITICAL YEARS BY 4 RIVERS INDEX - NOVEMBER 23, 1983

YEAR	UCI	NOV	D/C	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
9495	42	45	937	1571	374	267	179	477	190	104	38	49	4643
9505	95	176	473	2047	343	363	103	70	64	66	52	49	4358
9697	41	36	58	256	556	969	510	137	109	81	46	49	2887
9793	41	46	59	96	81	51	47	58	35	45	40	39	633
9897	37	34	60	53	54	354	61	115	97	69	31	44	1017
9407	259	25	103	535	573	241	853	274	142	104	41	51	3201
1	55	34	153	767	583	904	238	172	142	104	39	50	3299
102	41	219	441	441	190	417	170	226	153	104	34	50	2617
203	57	225	755	446	116	147	85	157	107	81	47	51	2276
304	71	71	117	331	1590	1043	1002	416	301	101	32	49	5229
405	102	179	323	897	162	143	118	234	291	104	33	51	2547
506	42	194	197	1216	1335	635	507	647	255	104	32	47	5211
607	44	354	664	253	1345	1456	555	645	395	104	31	44	5393
703	85	173	57	144	575	290	65	114	97	73	47	51	1775
803	42	45	695	1550	834	267	129	437	190	104	38	49	4390
913	74	123	161	807	533	904	238	172	142	104	39	50	3470
1011	42	45	109	1137	1335	635	474	647	255	104	33	47	4963
1112	47	167	39	237	472	83	89	65	48	45	36	45	1373
1213	47	45	56	130	437	91	86	114	97	36	31	46	1216
1314	41	45	782	1571	334	264	150	437	190	104	33	49	4500
1415	95	176	445	2043	343	356	103	139	142	110	42	50	4550
1516	42	42	201	369	465	469	487	461	402	104	32	46	3127
1617	63	200	42	261	35	277	698	224	109	81	46	51	2138
1718	46	45	55	68	232	127	76	65	49	48	42	49	901
1819	42	45	56	61	54	111	264	305	140	81	45	51	1255
1920	57	131	42	113	276	164	90	54	35	47	52	51	1102
2021	41	135	641	482	202	319	133	225	153	104	35	50	2522
2122	46	171	148	96	445	316	156	396	179	81	38	47	2109
2223	46	171	148	96	445	316	156	396	179	81	38	47	2109
2324	41	45	55	70	479	93	293	205	104	81	33	36	1521
2425	41	45	55	70	479	93	293	205	104	81	33	36	1521
2526	41	45	55	70	479	93	293	205	104	81	33	36	1521
2627	41	45	55	70	479	93	293	205	104	81	33	36	1521
2728	41	45	55	70	479	93	293	205	104	81	33	36	1521
2829	41	45	55	70	479	93	293	205	104	81	33	36	1521
2930	41	45	55	70	479	93	293	205	104	81	33	36	1521
3031	41	45	55	70	479	93	293	205	104	81	33	36	1521
3132	35	45	64	82	143	45	76	69	60	55	37	36	811
3233	35	45	64	82	143	45	76	69	60	55	37	36	811
3334	35	45	64	82	143	45	76	69	60	55	37	36	811
3435	35	45	64	82	143	45	76	69	60	55	37	36	811
3536	35	45	64	82	143	45	76	69	60	55	37	36	811
3637	41	15	45	294	600	468	127	152	97	69	43	49	1626
3738	41	15	45	294	600	468	127	152	97	69	43	49	1626
3839	113	193	62	253	1291	1484	524	645	395	104	31	44	5561
3940	35	45	61	267	665	942	527	137	124	104	39	48	2796
4041	41	46	423	943	1243	940	771	475	142	104	36	46	5150
4142	60	193	503	826	1437	215	491	308	218	104	32	44	4521

DELTA OUTLET - PI465 ONLY
 PLUGS AND M-24 MONTHLY * 100'S OF CFS
 COORDINATE BY RIVERS INDEX - CRITICAL YEARS BY 4 RIVERS INDEX NOVEMBER 23, 1983

YEAR	LCI	YFC	J71	529	3FR	471	J07	JUL	AUG	SEP	TOTAL
4243	71	190	125	583	238	172	142	104	39	50	3495
4345	49	65	55	232	76	65	43	48	47	47	904
4445	42	70	87	539	65	133	97	69	37	49	1500
4546	45	109	776	133	85	157	102	81	48	51	2153
4647	41	45	60	33	81	65	43	45	39	49	735
4748	41	45	55	50	200	309	163	81	44	49	1192
4849	41	104	45	59	490	70	43	45	36	44	1104
4950	41	15	55	268	97	138	97	69	31	44	1126
5051	44	254	534	696	103	163	56	65	52	51	3646
5152	45	172	443	315	521	658	334	104	31	45	4704
5253	42	175	465	162	116	214	201	104	33	51	2645
5354	42	219	68	177	341	175	107	81	47	51	2172
5455	42	64	154	40	76	66	43	45	40	50	903
5556	41	65	732	376	290	426	133	104	33	49	4489
5657	46	171	39	241	397	172	97	69	47	51	1519
5758	71	152	112	1718	1091	415	361	104	32	49	5408
5859	84	171	39	189	89	65	43	45	36	44	1433
5960	41	15	66	293	66	73	61	54	36	49	863
6061	41	45	71	215	79	65	43	45	36	44	865
6162	41	45	70	542	70	114	97	69	32	44	1362
6263	265	92	179	790	867	273	142	104	34	50	3625
6364	43	191	53	101	91	65	43	45	45	50	998
6465	41	59	660	271	110	174	142	104	38	50	3269
6566	41	137	71	229	102	68	61	54	52	51	1313
6667	42	49	317	152	486	462	101	104	32	46	3309
6768	75	195	57	619	65	73	61	59	52	51	1745
6869	42	45	129	1332	493	646	254	104	33	47	4778
6970	40	177	424	842	103	70	69	70	53	50	4355
7071	41	127	585	166	119	226	153	104	34	50	2413
TOTAL	6745	4379	35296	27040	16481	18612	5983	10145	3605	2976	189681
AVERAGE	56	113	233	499	351	214	131	77	38	46	2463

Appendix E

FLOOD PLAIN MANAGEMENT AND PROTECTION OF WETLANDS

FLOOD PLAIN MANAGEMENT AND PROTECTION OF WETLANDS

To the extent practicable, the Bureau has integrated flood plain management and wetland protection requirements into this environmental evaluation process.

The following information is in compliance with Reclamation Instructions Series 350, part 378, and is required by Executive Orders 11988 and 11990.

REPORT OF FINDINGS

The proposed action coordinates operations of project facilities which are located in flood plains and wetlands.

The Department of Water Resources and the U.S. Bureau of Reclamation propose to enter into a new Coordinated Operation Agreement for the State Water Project (SWP) and the Federal Central Valley Project (CVP). Before executing the proposed Agreement, the two agencies have prepared this joint environmental document to comply with State and Federal environmental quality acts.

This report evaluates the environmental consequences of the Proposed Action of signing and implementing the draft Coordinated Operation Agreement as compared to the environmental consequences of No Action; i.e., not signing and implementing the proposed Agreement. "Modified Agreement" alternatives, involving hypothetical agreements or agreement terms not included in the Proposed Action, are discussed. The Bureau of Reclamation and the Department of Water Resources conclude that the Proposed Action is their preferred alternative--preferred because it would provide a reliable and mutually acceptable basis for coordinating the operations of the Central Valley Project and the State Water Project while protecting the

water-related environment in the Sacramento-San Joaquin Delta. The Proposed Action could reduce the capability of the Central Valley Project operators to control water temperatures for salmon spawning and rearing in the upper Sacramento and Trinity Rivers in the driest years.

The proposed Coordinated Operation Agreement conforms to applicable State or local flood plain or wetland protection standards. The proposed agreement does not support or prohibit development in the base flood plain. A discussion of public involvement related to this proposal is presented in the Consultation and Coordination section of this EIS/EIR.

Appendix F

CLEAN WATER ACT - SECTION 404 COMPLIANCE



APPENDIX F

CLEAN WATER ACT - SECTION 404 COMPLIANCE

The proposed project will involve no discharge of dredged or fill material into waters or wetlands of the United States. Therefore, the requirements of Section 404 of the Clean Water Act (33 USC 1344) do not apply.

Appendix G

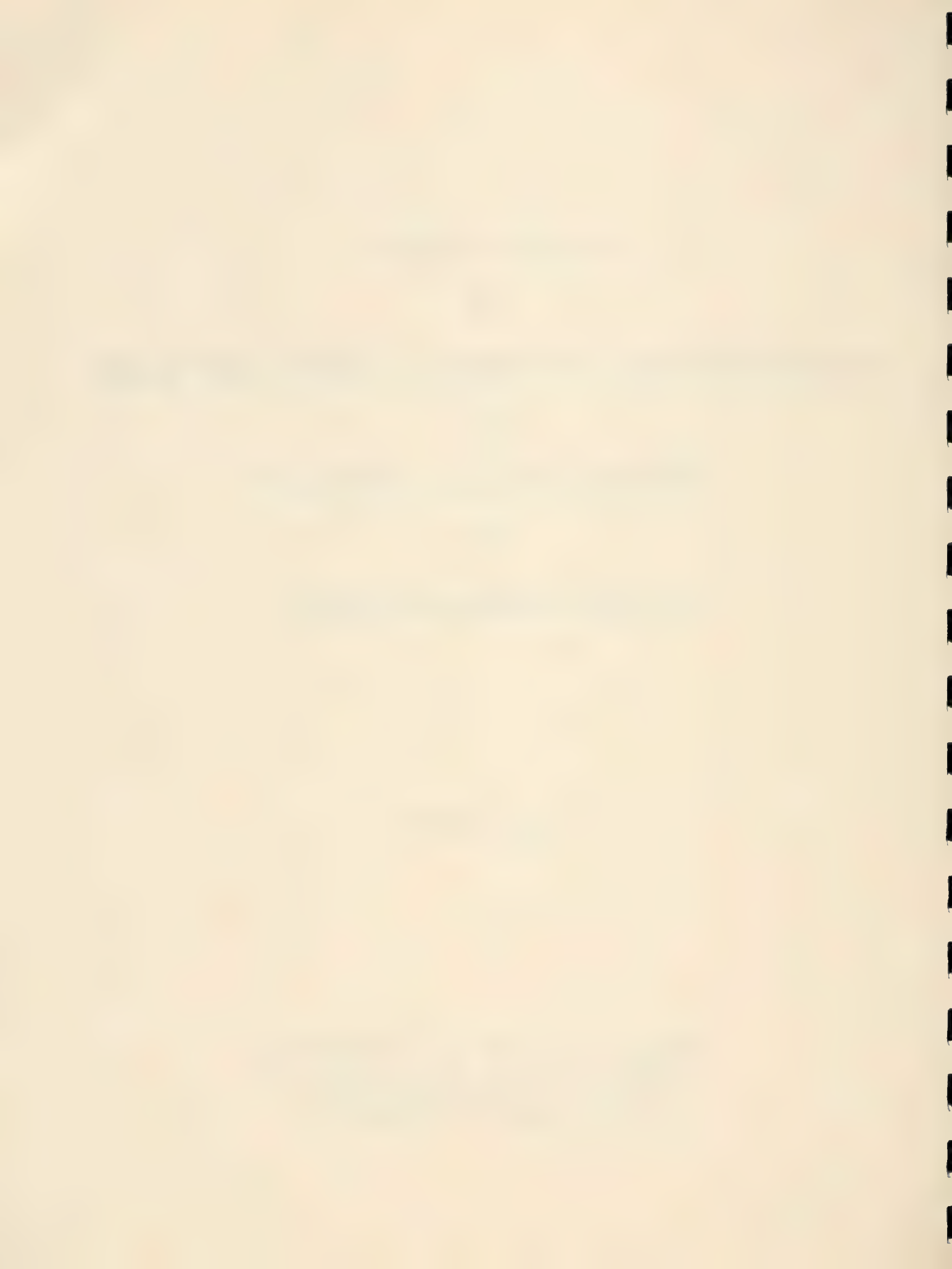
TECHNICAL REPORT ON DETERMINATION OF
ANNUAL WATER SUPPLIES FOR CENTRAL VALLEY PROJECT
AND STATE WATER PROJECT



TECHNICAL REPORT
ON
DETERMINATION OF ANNUAL WATER SUPPLIES
FOR
CENTRAL VALLEY PROJECT
AND
STATE WATER PROJECT

MARCH 1984

**PREPARED BY U.S. BUREAU OF RECLAMATION AND
CALIFORNIA DEPARTMENT OF WATER RESOURCES
TO SUPPORT THE DRAFT COORDINATED
OPERATION AGREEMENT OF DECEMBER 1982.**



DEPARTMENT OF WATER RESOURCES

P.O. BOX 388
SACRAMENTO, CA 95802

Mr. James Moore
U. S. Bureau of Reclamation

Mr. Lawrence Mullnix
Department of Water Resources

Coordinated Operation Agreement

Attached for consideration by the negotiation team is a TECHNICAL REPORT concerning the assumptions, criteria, and operation study procedures used to determine the annual water supplies available to the Central Valley Project (CVP) and the State Water Project (SWP). This technical report is referred to in the first basic point mentioned in the transmittal letter of December 22, 1982, regarding the draft agreement.

The operation studies support a finding that under the 1980 level of development in the Central Valley the CVP would have an available supply of 6.9 million acre-feet (MAF) and the SWP would have a supply of 3.7 MAF, including the Feather River service area. Under the projected 2020 level of development the CVP supply would be 8.2 MAF and 3.1 MAF would be available to the SWP.

To assure the foregoing annual supplies under the 1980 level of development and a repeat of a critical dry period such as occurred in 1928-1934, the responsibility for meeting Sacramento Valley in-basin use with storage withdrawals during balanced water conditions should be 75 percent CVP and 25 percent SWP. When unstored water for export is available each project's responsibility for in-basin use and exports should be determined by allocating stored water and unstored water 55 percent CVP and 45 percent SWP.

Handwritten signature of Lyle B. Everett, Jr.

Lyle B. Everett, Jr.
Bureau of Reclamation

Handwritten signature of Jerry D. Vayder.

Jerry D. Vayder
Department of Water Resources

Attachment

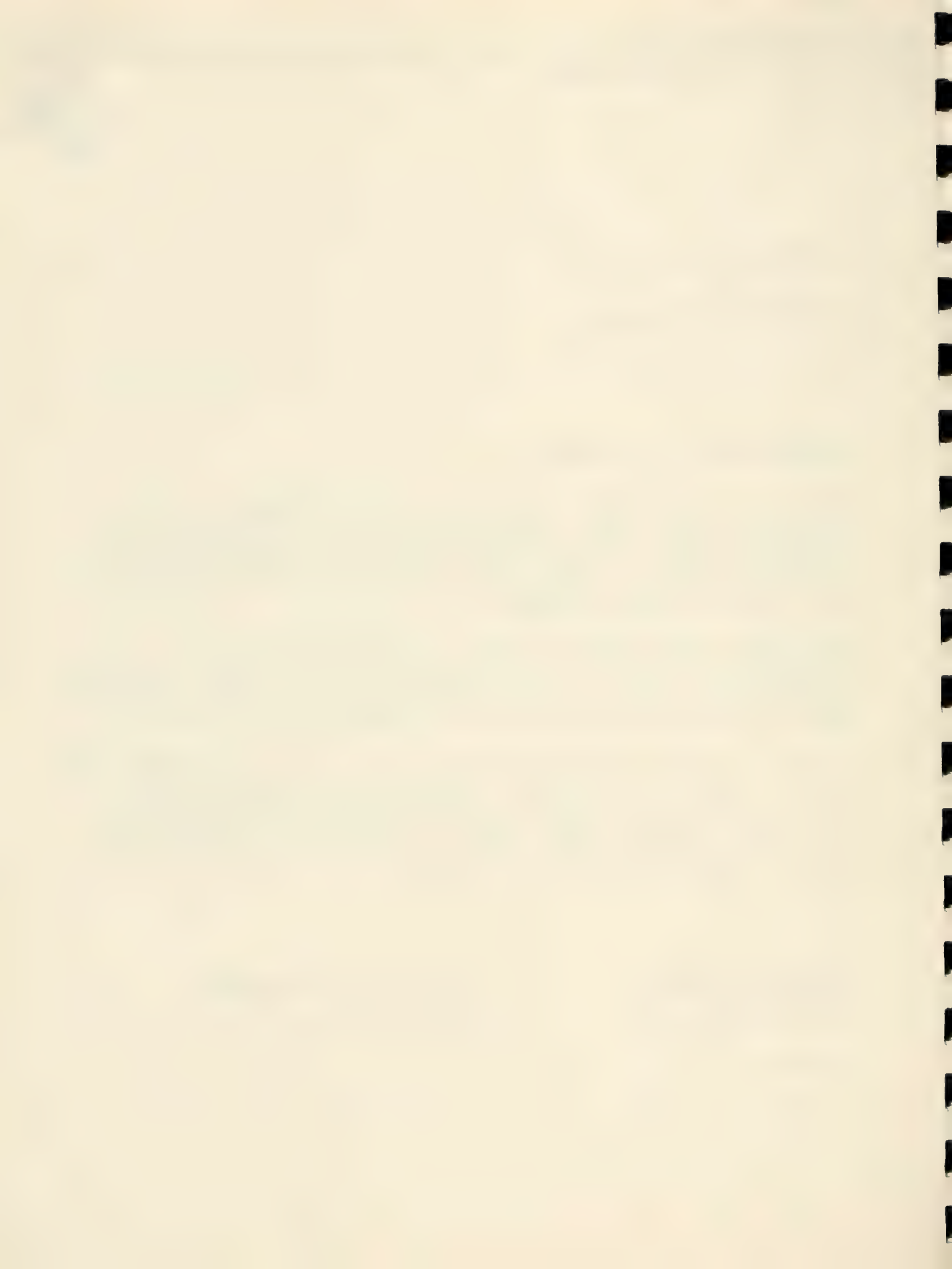


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B. 2020 Operation Study - USCAL-3-82



INTRODUCTION

In late 1981 and all of 1982, during the negotiations leading to a Coordinated Operation Agreement (COA), a series of operation studies was prepared by the staffs of the Bureau of Reclamation (USBR) and the Department of Water Resources (DWR). These studies were prepared for the purpose of determining the respective water supplies of the Central Valley Project (CVP) and the State Water Project (SWP) while allowing for a negotiated sharing of Sacramento-San Joaquin Delta (Delta) excess outflows and the satisfaction of in-basin obligations between the two projects. Results of these studies were used to develop the sharing formula portion of the COA which will be used in day-to-day coordinated operation of the two projects.

Since 1959, water right priorities has been a major issue between the USBR and DWR. The May 16, 1960, agreement between the two agencies was entered into by the USBR to remove the DWR as a protestant in the State Water Rights Board (later to become the State Water Resources Control Board) hearings that led to Decision 990. The USBR holds water right permits for most of its major CVP facilities that are senior to or have an earlier date than most DWR permits on the SWP. To perform a strict water right analysis of a complex intermingled system such as the CVP, the SWP, and all other water rights holders on streams tributary to the Delta would constitute an engineering and legal nightmare.

To alleviate such concern, and greatly simplify the analysis, the preparation of the operation studies to determine project yields and equitable sharing of available water supply was accomplished following a step-by-step procedure developed during the negotiation sessions. It can generally be described as a "first-in-time" process wherein the first units constructed have first opportunity to use the available water supply. It should be noted that the use of this process to expedite the generation of operation studies did not represent a concession by either agency regarding the seniority of their respective water rights.

The "first-in-time" units would not only have first opportunity to use available water supplies, but would be expected to ensure that water quality conditions in the Delta would be maintained at a level agreed to by each agency and set forth in Exhibit A of the COA. For the purposes of these studies the D-1485 criteria, except permanent Suisun Marsh standards, were met.

Using the "first-in-time" approach, as mentioned above, the water supply studies were accomplished in two stages. In the first study the existing CVP system, primarily Clair Engle Lake, Whiskeytown Lake, Shasta Lake, and Folsom Lake, was operated to satisfy all prior water rights and environmental requirements including instream flow requirements of the Trinity, Sacramento, and lower American Rivers, Sacramento Valley in-basin uses, Delta uses, Vallejo base supply, and required Delta outflow to meet COA Exhibit A water quality standards. In addition, the CVP facilities were operated as necessary to provide sufficient water supply in the Delta to satisfy current contractual demands of the Delta Mendota Canal service area, the Mendota Pool service area, and the Contra Costa Canal service area. The Feather River, in this stage, was unimpaired by any SWP facilities.

In the second study the SWP and the San Luis Unit of the CVP were added to the operation as second-in-time features. Essentially, each project was able to use its share of the Study No. 1 excess outflow and operate all existing facilities in a manner consistent with current operating policy. In Study No. 2 Shasta and Folsom Reservoirs were operated to minimize or eliminate spills in surplus months, and to optimize operations of each to provide for increased CVP releases for San Luis or other Delta requirements provided that such reoperation did not reduce the supply available to the SWP.

ASSUMPTIONS

Annual water supplies available to the CVP and SWP are based on simulated operation studies of existing facilities during a critically dry hydrologic period such as occurred in the Central Valley during 1928 through 1934. It is assumed that project accomplishments during this prolonged "critical period" represent a firm measure of project capability. Firm measure is defined as the firm water supply yield that can be supplied in all years. In order to take advantage of the abundant water supply in normal years, deficiency criteria are established to moderate the effect of the critically dry period. It is assumed that deficiencies totaling 100 percent of 1 year's agricultural supply can be tolerated during the 7-year 1928 through 1934 period.

The COA studies were performed for two levels of development -- year 1980 and year 2020. The 1980 level studies were done to (1) provide near-term operating guidelines for the USBR and DWR, and (2) provide an estimate of the incremental CVP water supply available in excess of the 1980 level demands, as well as determine the extent to which the SWP can currently satisfy its water contractors.

The year 2020 level studies were to (1) provide an estimate of long-term water supply yield attainable by each project using existing facilities, and (2) provide data for developing long-term operating criteria for both projects assuming no new construction while continuing to meet Exhibit A Delta water quality criteria.

1980 Level Hydrology

Hydrologic data for the 1980 COA study was based on depletion studies performed by DWR and described in the August 22, 1977, DWR memorandum report entitled "Input Data for the 1980 and 2000 Level Central Valley Depletion Studies". The depletion study concept was derived, out of necessity, in the early 1960s as a means to establish a mutually acceptable hydrologic base by which the accomplishments of the CVP and the SWP could be measured. One way to measure these accomplishments is to simulate an operation of the CVP and SWP facilities through a historical sequence of years but with the historical hydrology adjusted to reflect the level of development to be studied.

Simply stated, the depletion study concept entails converting historical water supplies to what the supplies would be under a projected level of development (e.g., 1980, 2000, 2020).

The Central Valley of California was divided into 40 subareas including all the basins tributary to the Delta. Historical monthly data was collected for each subarea and included inflow and outflow, imports and exports, consumptive use by developed areas, and any modifications due to manmade regulatory facilities. Equivalent data was then estimated for projected imports and exports, projected modifications due to present and future regulatory facilities, and then superimposed on the historical conditions. The resultant projected inflows and outflows were used in the simulated operation studies. Of particular importance are the projected inflows or water supplies available to project reservoirs, the projected flows in the major streams where streamflow maintenance is a concern, and all projected inflows to the Delta. The depletion analysis, while modifying historical data, includes allowances for reasonable estimates of non-CVP and non-SWP development in all basins tributary to the Delta.

2020 Level Hydrology

Hydrologic data for the 2020 COA study was based on joint depletion studies described in a September 1966 office report entitled "Explanation of Input Data, Joint DWR-USBR Central Valley Depletion Study of July 1966". This is the same hydrologic data used for the operation studies supporting the 1971 unsigned Supplemental Coordination Agreement.

The historic flows from all streams tributary to the Delta were modified to reflect estimated year 2020 level of development. The modifications included allowances for reasonable estimates of non-CVP and non-SWP development at the 2020 level.

Facilities

Scope of the COA studies was limited to the water supplies that could be developed and delivered by existing CVP and SWP facilities. The facilities are listed in Table 1.

The 1980 level study assumed facilities as they existed at that time. The one exception was that New Melones Dam and Reservoir was assumed completed but operated essentially to the conditions set forth in D-1422. Fish releases were 8 TAF/yr; water quality releases to meet 500 ppm/tds at Vernalis were provided; a maximum storage limit of 700 TAF was used; and the Oakdale and South San Joaquin Irrigation District's yield according to the stipulation with the United States was adhered to. This was the assumption at the time the COA studies were initiated.

The State Water Resources Control Board on March 8, 1983, issued Board order 83-3 which allowed the Bureau to fill New Melones. If the 1980 study had

been made assuming a full New Melones, the pattern of spills to the Stanislaus River would have been different, thus altering the timing and magnitude of Delta surpluses. However, a cursory check showed that the impact on CVP and SWP yield was minimal during the 1928 through 1934 critical period.

The year 2020 level study also assumed existing facilities with the following changes:

1. Tehama-Colusa Canal completed.
2. New Melones was assumed to fill to its 2.4 million acre-foot capacity. The D-1422 fishery and water quality requirements were met as well as the Oakdale and South San Joaquin Irrigation District diversions. The incremental yield attributable to New Melones was allocated to local in-basin uses.
3. Permanent Suisun Marsh standards were not met. This was the only D-1485 criteria not included in Exhibit A water quality criteria. To meet this criteria would require new facilities; thus it was excluded.

TABLE 1

Existing Facilities

Central Valley ProjectState Water ProjectReservoirs

Shasta Lake
 Keswick Reservoir
 Clair Engle Lake
 Lewiston Lake
 Whiskeytown Lake
 Folsom Lake
 Lake Natoma
 San Luis Reservoir (Joint)
 O'Neill Forebay (Joint)
 Millerton
 New Melones

Lake Oroville
 Thermalito Forebay
 Thermalito Afterbay
 Thermalito Diversion
 Dam Reservoir
 San Luis Reservoir (Joint)
 O'Neill Forebay (Joint)
 Lake Davis
 Antelope Lake
 Lake Del Valle
 Pyramid Lake
 Castaic Lake
 Silverwood Lake
 Lake Perris

Conveyance Facilities

Corning Canal
 Tehama Colusa Canal
 Cow Creek Unit
 Clear Creek South Unit
 Folsom South Canal (Reach 1 and 2)
 Delta Cross Channel
 Delta Mendota Canal

Feather River Service
 Area Canals
 California Aqueduct
 South Bay Aqueduct

Delta Export Facilities

Contra Costa Pumping Plant #1
 Tracy Pumping Plant

Harvey O. Banks Delta
 Pumping Plant,
 including Clifton
 Court Forebay

SERVICE AREA DEMANDS AND DEFICIENCIES

The 1980 level operation studies were made to meet current CVP contract obligations in the Sacramento Valley, American River Basin, and for Delta export service areas. A list of these obligations is presented on Table 2. The Cross Valley Canal demand of 128 TAF per year is an obligation of the CVP and thus it is shown in Table 2 but not in the totals. It was not included in the simulated operation studies that resulted in the sharing formula due to the fact that it would be met only by wheeling through SWP facilities. A separate

analysis was made to determine the extent to which Cross Valley demands could be wheeled and the impact it would have on CVP storage. In addition, Exhibit B-1 in the COA includes under CVP supplies an item referred to as "Incremental Supply". This is supply remaining in CVP storage after meeting all of the demands listed in Table 2, including Cross Valley. This supply was not allocated to a particular demand since it would require that the moratorium on new CVP contracts be lifted, and, additionally, may require SWP wheeling.

The 2020 operation studies were made in a manner which optimized the water supplies of each project. The 2020 level CVP demands are shown also on Table 2 and include maximum obligations on current contracts plus additional service to service areas that have expressed a strong desire to contract with the Bureau, and can be supplied from existing CVP facilities. Again, the Cross Valley Canal demand and the "Incremental Supply" were not included in the initial simulations but were accounted for in Exhibit B-2 of the COA and a separate analysis.

The SWP was operated at both the 1980 level and the 2020 level to deliver the maximum possible water supply to its contractors using its share of Central Valley runoff and the remaining federal share that could not be utilized with existing CVP facilities.

A demand pattern for the 1980 level study was developed by using the DWR Bulletin 132-81 projected 1983 entitlement delivery south of Dos Amigos. South Bay area demands were also taken from Bulletin 132-81 and were increased to account for use and losses along the North San Joaquin Division of the California Aqueduct and for evaporation from San Luis Reservoir. Table 3 shows a summary of SWP demands that could be met at the 1980 level and at the 2020 level.

As mentioned earlier, it is assumed in the draft COA studies that allowable deficiencies in some service areas can be tolerated in critical years. It has been estimated that a deficiency or shortage of 100 percent of 1 year's supply distributed over the 7-year period (1928-1934) can be tolerated in most agricultural service areas without causing a permanent loss of capital investment.

In the 1980 level COA study, deficiencies of 25 percent per year were assumed in CVP irrigation service areas in 1931, 1932, 1933, and 1934. Most of the current contracts with CVP irrigators have deficiency clauses with reference to Shasta Reservoir inflow criteria which, in turn, indicates that the above years are critical. The SWP deficiency policy is more closely associated with Feather River runoff and the four-rivers index criteria, which indicates that 1929, 1931, 1933, and 1934 are critical. However, it does not benefit the SWP to take a deficiency in 1929 since Oroville Reservoir storage is adequate in this year and to impose a deficiency would cause Oroville to spill, thus wasting water. The SWP operating criteria assumed that allowable deficiencies of 25 percent would be taken in 1931 and 1934, and 50 percent in 1933.

In the 2020 level COA study it is assumed that most Bureau contracts will have been renegotiated and that the four-rivers index criteria will be used to trigger deficiencies. Thus the same four 25-percent deficiencies were taken but in 1929, 1931, 1933, and 1934. The SWP approach was the same as used in the 1980 level study.

TABLE 2

Central Valley Project Service Area Demands
and Deficiencies
(Acre-Feet/Year)

	<u>1980 Demand</u>	<u>2020 Demand</u>
<u>Sacramento Valley</u>		
Clear Creek South	5,737	15,300
Cow Creek South	10,000	24,000
City of Redding	900	6,140
Feather Water District	20,000	20,000
Spring Creek Conduit	400	1,500
Toyon Pipeline	1,700	3,960
Shasta Area	500	9,000
Sacramento River Diverters		
Project Water	376,625	374,335
Base Supply	1,818,000	1,818,416
Bypasses and Riparian	500,000	500,000
Wildlife Refuges	40,000	105,000
Sacramento Canals		
Corning Canal	43,000	60,800
Tehama-Colusa Canal	125,000	430,200
Losses	12,000	12,000
Stony Creek Diverters	0	170
SUBTOTAL	<u>2,953,862</u>	<u>3,380,821</u>
<u>American River</u>		
El Dorado County	2,000	6,166
El Dorado County W.R.	1,000	103,834
San Juan Suburban	6,000	40,200
City of Roseville	9,000	32,000
North Fork, Natomas Ditch, etc.	62,000	88,000
Placer County	20,000	117,000
City of Sacramento	50,000	230,000
Folsom South Canal		
Irrigation	4,806	250,000
SMUD	25,000	75,000
EBMUD	0	150,000
Losses	20,000	40,000
SUBTOTAL	<u>199,806</u>	<u>1,132,200</u>

TABLE 2 (Continued)

Central Valley Project Service Area Demands
and Deficiencies
(Acre-Feet/Year)

	<u>1980 Demand</u>	<u>2020 Demand</u>
<u>Delta</u>		
Delta Mendota Canal		
DMC Marketing Program	589,778	602,092
DMC Interim	0	48,000
Exchange Contracts	840,000	840,000
Schedule II	38,000	37,277
Grasslands	50,000	50,000
State of California	19,000	19,000
Patterson	0	6,000
Losses	120,000	120,000
Contra Costa Canal		
Schedule A	86,000	86,000
Schedule B	4,000	39,000
Schedule C	0	70,000
San Felipe Unit	0	196,300
San Luis Canal		
San Luis Irrigation	1,172,700	1,179,200
San Luis Interim	200,000	57,000
Municipal and Industrial	15,100	16,500
Miscellaneous	0	5,700
Losses	40,000	59,000
Reservoir Evaporation	28,000	28,000
Cross Valley Canal	(128,000)	(128,000)
	<u>3,202,578</u>	<u>3,459,069</u>
	TOTAL	TOTAL
	6,356,246	7,972,090
	<u>1980 Deficiency</u>	<u>2020 Deficiency</u>
Sacramento Valley	592,994	858,000
American River	-38,194 *	160,000
Delta	907,658	785,000
	<u>1,462,458</u>	<u>1,803,000</u>

* Some M&I contractors, currently not taking full contract entitlement, would most likely request additional delivery during drought periods.

TABLE 3

State Water Project Service Area Supplies
and Deficiencies
(Acre-Feet/Year)

	<u>1980 Supply</u>	<u>2020 Supply</u>
<u>South Bay Area</u>		
Municipal and Industrial	118,000	118,000
Agricultural	28,000	28,000
Losses and Recreation	21,000	21,000
San Luis Evaporation	35,000	35,000
SUBTOTAL	<u>202,000</u>	<u>202,000</u>
<u>Dos Amigos</u>		
Municipal and Industrial	1,335,000	1,000,000
Agricultural	1,052,000	790,000
Losses and Recreation	111,000	87,000
SUBTOTAL	<u>2,498,000</u>	<u>1,877,000</u>
<u>Feather River</u>		
Organized District Irrigation	885,000	885,000
Municipal and Industrial	8,000	46,000
Other Irrigation	100,000	100,000
SUBTOTAL	<u>993,000</u>	<u>1,031,000</u>
TOTAL	3,693,000	3,126,000
	<u>1980 Deficiency</u>	<u>2020 Deficiency</u>
Dos Amigos	263,000	198,000
Feather River	150,000	150,000
TOTAL	<u>413,000</u>	<u>348,000</u>

OPERATIONS CRITERIA

The operating criteria used in these studies was intended to closely approximate current operating practices used by each agency. The experiences gained from operating through the 1976-77 drought provided guidelines for critical years, and in particular, a series of critical years.

Both CVP and SWP reservoirs are operated first to meet mandatory requirements such as releases to maintain minimum fishery and navigation flows, downstream water rights, and local project demands. In most normal and wet years, the maintenance of these minimum requirements is academic. However, during a critically dry period such as 1928 through 1934, water resources are limited and the water supply yield developed by the CVP and SWP in the Delta depends upon withdrawal from storage to augment mandatory releases.

In the 1980 level study, the use of water by Bureau contractors is less than their maximum entitlement. This provides flexibility in Shasta and Folsom Reservoirs, even in dry and some critical years, to permit the maintenance of flows in excess of minimum fishery, navigation, recreation, and irrigation requirements.

The SWP water supply that can be attained at either level of development is directly related to the amount of Delta surpluses. At the 1980 level the additional releases made from CVP facilities, along with less upstream nonproject depletions, result in greater and more frequent Delta surpluses than the 2020 level. For this reason, the 1980 SWP export water supplies are greater (2.7 MAF/yr) than the 2020 SWP water supplies (2.1 MAF/yr).

CVP Operation - 1980 Level

The simulated operation of Clair Engle, Whiskeytown and Shasta Reservoirs was based on USBR hydroelectric power generation experience. Releases were made from Clair Engle for export into the Sacramento Basin as well as fishery flows to the Trinity River. Exports from the Trinity River via Judge Francis Carr Tunnel were maintained at about 670 TAF/yr. during the critical period. During more normal hydrologic periods this export averages closer to 900 TAF/yr. Fishery releases to the Trinity River below Lewiston were maintained at 287 TAF/yr. in normal years but were reduced to 220 TAF/yr. in dry years and 140 TAF/yr. in critical years based on Shasta inflow criteria. A flood reservation was maintained during the period of November through February.

A relatively simplistic operation was used for Whiskeytown Reservoir. End of month storage was maintained at 238 TAF from April through September and at 203 TAF from October through March. Releases were made to Clear Creek to meet downstream demands for water rights, streamflow maintenance and project use. The remainder was exported to Spring Creek PH and Keswick Afterbay.

Releases from Shasta Reservoir were made in conjunction with Trinity River imports to meet minimum flows for water rights, irrigation, navigation, and fish requirements and, in the 1980 level study, provide excess releases for

fishery enhancement below Keswick. If these releases were depleted before reaching the Delta and thus became unavailable to meet CVP exports and its share of in-basin use, then additional releases were made from Shasta or from Folsom Reservoirs.

Operation of Folsom Reservoir was guided by several factors including storage levels through Labor Day, recreation and fish flows in the lower American River, and project demands for water supply. In most years a minimum of 1,500 cfs could be provided with summer flows increased to between 3,000 and 4,500 cfs for recreational use. If there was sufficient water in Folsom after meeting these releases and there were remaining demands in the Delta, additional releases were made from Folsom.

There are several factors taken into consideration while generating the 1980 COA studies. These are data items that are used to establish the current year's operation of the CVP and are as follows:

1. Total CVP storage in Shasta, Clair Engle and Folsom on February 1.
2. Predicted reservoir inflows from February 1 through the remainder of the current water year (based on February 15 forecast).
3. Existing minimum fishery, recreation, and navigation flows, as well as minimum requirements for downstream water rights and local project service areas.
4. Desired levels of supplemental flows for these purposes, primarily for fishery enhancement.
5. Minimum target storages (October 1) at all reservoirs both for normal year recreation purposes and protective storage levels for operation through a potential critical dry period.

Specific guidelines were developed for the 1980 operation studies for the following CVP facilities:

Folsom Reservoir

1. Keep Folsom Reservoir storage at 600 TAF or above until Labor Day for recreation purposes except in dry and critical years. In dry years (four-rivers index criteria) the Folsom storage was allowed to drop to 400 TAF by Labor Day, while in critical years the storage was dropped even more to meet water needs.
2. Make minimum releases of 1,500 cfs below Nimbus to the American River if forecasts can support them.
3. Make supplemental releases above 1,500 cfs in summer months (June, July, and August) for recreational purposes. The maximum flows in July and August ranged between 3,000 and 4,500 cfs and were made even in critical years when CVP Delta demands existed. These supplemental releases were coordinated with Keswick releases so as not to create Delta surpluses.
4. If the resultant total CVP storage in Shasta, Folsom and Clair Engle on September 30 was less than 3.0 million acre-feet, the Nimbus fish releases were reduced to 800 cfs in months when Delta demands did not require additional CVP releases. This flow was maintained until February 1 and then restored to 1,500 cfs.

Shasta Reservoir

1. Maintain a minimum Keswick fish release of 4,000 cfs.
2. If the September end of month storage in Shasta is 2.0 million acre-feet or less, reduce the fish flows to the current fishery agreement schedule beginning with October and continue through the following March.
3. Make additional releases to the Delta when needed for CVP demands in coordination with Nimbus releases so as not to create Delta surpluses.

San Luis Reservoir

1. Operate San Luis Reservoir to meet San Luis service area demands. Take advantage of any surplus flows in the Delta.
2. Assume the Tracy Pumping Plant capacity of 4,600 cfs (March through October) and 4,200 cfs (November through February). The DMC capacity available for San Luis after meeting DMC irrigation demands was based on a routing study which reflected limiting DMC capacities at O'Neill Forebay (4,200 cfs) and the DMC deliveries between Tracy and O'Neill.
3. Fill San Luis (971,000 acre-foot Federal share) by April in all non-critical years, pump at the maximum when historically Delta surpluses are known to occur (January-April), and limit pumping when possible in September and October since surpluses generally do not occur in these months.
4. Make release-backs to the DMC to meet irrigation demands by DMC users below San Luis when possible. This was done in critical years to minimize summer pumping knowing that with deficiencies being taken in these years, there is a reduced annual drawdown from San Luis and a greater amount of DMC capacity was available to refill San Luis in winter months when surpluses were generally available.

SWP Operation - 1980 and 2020 Level

Oroville Reservoir on the Feather River was operated for flood control, to satisfy minimum flow requirements in the Feather River to meet local water demands and fish flows, and to augment the Delta water supply to meet the State's portion of in-basin use. When necessary, additional releases were made for subsequent export in the California Aqueduct to San Luis Reservoir and Dos Amigos Pumping Plant for delivery to Southern California.

The Delta Pumping Plant has a current capability to export 6,400 cfs from the Delta. Minimum export quantity each month was equal to the South Bay Aqueduct demand plus use within the North San Joaquin Division of the California Aqueduct.

The State's portion of San Luis Reservoir is 1,067,000 acre-feet which can be filled by the end of April each year. To the extent possible, Delta surpluses and any unused CVP share of unstored flows were used to fill San Luis, and supplemental releases were made from Oroville Reservoir only in order for San Luis to reach the minimum "rule curve" storage.

CVP Operation - 2020 Level

The 2020 COA studies, with less flexibility in the CVP, were run with minimum fish releases below system reservoirs controlling much of the time. Flows in the Trinity River below Lewiston were maintained at 120 TAF/yr.

The operation of Folsom was guided by the same factors as in the 1980 level study, but with flows below H Street on the American River maintained according to D-893 minimum fish flows of 210 TAF/yr with allowable deficiencies in critical years.

The operation of Shasta was integrated with the Trinity system to meet minimum flow requirements below Keswick. The minimum fish release below Keswick was maintained at:

<u>Period</u>	<u>Flow</u> (cfs)
March through August	2,300
September through October	3,900
November through February	2,925

Required Delta Outflow

Minimum required Delta outflow necessary to satisfy the water quality objectives set forth in D-1485 were calculated using the method contained in a February 1981 report entitled "Delta Water Use and Outflow Estimate". These requirements are part of the in-basin use and must be satisfied from uncontrolled flows and storage releases if necessary.

Outflow requirements vary depending upon the month and year type. Furthermore, if there has been a surplus Delta outflow in the preceding month an adjustment can be made which reduces the current month's requirement. This adjustment was referred to as a "ramping saving". In years that the projects imposed a deficiency on deliveries of contract water the water quality objectives were also reduced and an appropriate adjustment was made in the outflow calculation.

Carriage Water

When export rates from the southern Delta are increased beyond a certain point, relative to inflow to the southern Delta, more water is drawn from the western Delta. To maintain suitable water quality at the export pumps, the saline water being drawn in must be repelled by increasing Delta outflow. The additional releases are called "carriage water" and are calculated as an additional adjustment to required Delta outflow.

The method for calculating carriage water is contained in the November 19, 1981 SWRCB Order WR81-15 (also known as SWRCB Permit Term 91).

STUDY PROCEDURE

Preparation of the operation studies to determine project yields and equitable sharing of available water supply was accomplished by following a step by step procedure developed during the negotiation sessions. It can generally be described as a "first-in-time" process wherein the first units constructed have first opportunity to use the available water supply and at the same time incur the obligation to meet in-basin uses including Delta water quality standards.

Under the existing level of development only two time steps needed to be considered. The first-in-time units were generally described as "CVP only without San Luis". The second-in-time units included the CVP San Luis facilities and the completed portion of the SWP. In the second portion of the study it was possible to initially approximate the CVP operation since it was affected to only a minor degree by operation of the SWP.

Study No. 1

The existing CVP system, primarily Clair Engle Lake, Whiskeytown Lake, Shasta Lake, and Folsom Lake, was operated to satisfy instream flow requirements of the Trinity, Sacramento, and lower American Rivers, Sacramento Valley in-basin uses including Delta use, Vallejo base supply, and required Delta outflow to meet COA Exhibit A water quality standards. In addition, the CVP facilities were operated as necessary to provide sufficient water supply in the Delta to satisfy current contractual demands of the Delta Mendota Canal service area, the Mendota Pool service area, and the Contra Costa Canal service area. The Feather River, in this step, was unimpaired by any SWP facilities.

Deficiencies imposed on water supply deliveries to each CVP service area were based on current USBR practice assuming the above system to be a complete unit. A 25 percent deficiency was imposed in 1931 except for Sacramento Valley riparian users.

Uncontrolled Sacramento Basin inflow to the Delta, Sacramento River below Keswick and American River below Nimbus, were augmented by Keswick and Nimbus releases and the San Joaquin River and other tributaries to produce the total Delta inflow of Study No. 1. Operation of CVP reservoirs in this step are shown in columns 1 through 45 of Appendix A (USCAL-2-82).

Disposition of the Delta inflow (Delta Balance) is shown in columns 61 through 75 including the amounts of excess Delta outflow available for sharing between the SWP and CVP in Study No. 2.

Required Delta outflow to meet Delta water quality standards and Delta use was computed month by month at this point since it is a function of water year type, month, and excess outflow during previous month. A fuller explanation of the method is given in the February 1981 report entitled, "Delta Water Use and Outflow Estimate". Delta inflow not needed to meet outflow requirements, Delta consumptive use, or base supply of the City of Vallejo was available for export in the Contra Costa Canal and Delta Mendota Canal. Any remaining excess outflow was shared in Study No. 2.

Study No. 2

The SWP and the San Luis Unit of the CVP were added to the operation study as the second-in-time features. Essentially, each project was able to use its share of the Study No. 1 excess outflow and operate all existing facilities in a manner consistent with current operating policy. In Study No. 2 it was possible to reoperate Shasta and Folsom Reservoirs to minimize or eliminate spills in surplus months and to optimize operations of each to provide for increased CVP releases for San Luis and other Delta requirements. By agreement, such reoperation could not reduce the supply available to the SWP. Detailed procedure for Study No. 2 was as follows:

Step 1. The excess Delta outflow from Study No. 1 (column 74) was shared 50/50 between SWP and CVP.

Step 2. Obligation for reduced ramping savings (resulting in an increase in required Delta outflow) was shared in proportion to the previous month use of excess Delta outflow by each project.

Step 3. Agricultural deficiency credits (which reduce required Delta outflow in April, September, October, and November, and increase required outflow in May and December) were shared in proportion to the additional imposed deficiencies in April and May and were shared 50/50 during September through December when both projects imposed additional deficiencies.

Step 4. Additional Delta water supply resulting from new or additional deficiencies imposed on DMC, CCC, and Sacramento Basin contractors was assigned to the CVP and, when feasible, used to meet CVP demands or returned to upstream storage.

Step 5. The CVP total available share from Steps 1 through 4 above was available for export through Tracy Pumping Plant to San Luis Reservoir. Where such share was insufficient to meet San Luis demands, additional releases from upstream storage were made. Any unused CVP share was available to the SWP.

Step 6. The SWP total available share from Steps 1 through 3 above, plus any unused CVP share from Step 5, was available for export via the Delta Pumping Plant to South Bay Aqueduct and San Luis Reservoir. In addition, Oroville Reservoir and the upper Feather River facilities of the SWP were added to the system at this point. Assuming only mandatory releases (column 49) were made initially from Oroville to meet FRSA and Feather River fish requirements, the initial modification by Oroville to Delta water supply was added to or deducted from the SWP total available share.

Step 7. SWP exports at the Delta Pumping Plant were made to meet projected future contractual demands on the SWP. The available share of Delta flow from Step 6 was augmented by additional releases (column 50) from Oroville Reservoir as necessary.

Step 8. The SWP was also responsible for carriage water releases (column 87) required to maintain Delta water quality during reverse flow conditions. This additional outflow requirement occurs when export rates from the southern Delta generally exceed inflow to the southern Delta by more than 4,000 cfs.

Step 9. Any remaining surplus Delta outflow was used to further reduce CVP upstream storage releases when feasible.

Step 10. After determining the final surplus Delta outflow (column 89), the reduced ramping savings needed in Step 2 was calculated and a final iteration was made.

Operation study results from the 1980 and 2020 levels were summarized and are presented in Appendices A and B. The 1980 level study is designated as USCAL-2-82 and the 2020 level study is USCAL-3-82.

Study No. 3

The procedure followed for studies 1 and 2 assumed full use of Tracy and Delta Pumping Plants capacity. Pumping restrictions to minimize diversion of young striped bass from the Delta, as shown in Exhibit A, were inserted in Study No. 3. Furthermore, the CVP Cross Valley Canal demand was added, and the Delta Pumping Plant and California Aqueduct were used to transport a portion of the required CVP exports.

Wheeling CVP water through SWP facilities to overcome operational constraints imposed by Exhibit A is provided for in the COA (Article 10(b)). Wheeling to satisfy Cross Valley Canal demands is covered in a separate agreement between DWR and USBR.

Additional releases were required from some CVP reservoirs and from Oroville Reservoir. Results of operation studies are identified as Study No. 3.

SHARING FORMULA

Results of the 1980 level Study No. 2 were used as a basis for developing a sharing formula. The purpose of the formula is to divide available water supply and responsibility for meeting in-basin use during balanced water conditions (periods of no surplus Delta outflow).

During the period May 1928 through October 1934 there were 66 months when balanced water conditions existed. Using data from operation study USCAL-2-82, "United States storage withdrawal", "State storage withdrawal", "United States stored water", and "State stored water" were each computed in accordance with Article 3 of the COA.

The difference between project storage withdrawal and project export was identified as either an "in-basin use of storage withdrawal" or "unstored water for export " (see Article 6(a) of COA).

Two periods of time are of specific interest in evaluating the accomplishments and capabilities of each project. The critical period for CVP operation extends from May 1928 through October 1931 when total remaining storage reaches

a minimum level. The SWP on the other hand has a critical period of May 1928 through October 1934 when its storage reaches a low point. Storage withdrawals, stored water, and unstored water for export are summarized in Table 4 for the months of balanced water condition during the two periods.

Remaining storage in system reservoirs at the end of dry periods is also of specific interest in establishing a sharing formula. Since the SWP was operated to maximize its firm yield capability, the end of period storage was at minimum level. The CVP reservoirs, however, were not drawn down to minimum operating levels and remaining storage was available for incremental water supply. Remaining reservoir storage is summarized in Table 5.

Several sharing formula splits were tried to determine a best fit with the results of operation study USCAL-2-82. Percentage values given in Table 4 represent averages for the months of balanced water condition over the entire critical period, but there are any number of variations that can be used with various degrees of success.

A sharing formula for CVP/SWP split of 75/25 for in-basin use and 55/45 for stored and unstored water was arrived at partly by reasoning and partly by trial and error. Using the formula in simulation operation models will produce results similar to those of USCAL-2-82.

TABLE 4

Sharing of Central Valley Water Supplies
During Balanced Water Conditions - 1980
(1,000 Acre-Feet)

<u>Sharing In-Basin Use</u>	<u>May 1928 - Oct 1931</u>		<u>May 1928 - Oct 1934</u>	
	<u>CVP</u>	<u>SWP</u>	<u>CVP</u>	<u>SWP</u>
Total Exports	8,670	6,462	14,341	11,487
Unstored Water for Export	<u>3,058</u>	<u>3,066</u>	<u>5,863</u>	<u>6,082</u>
Export of Storage				
Withdrawal	5,612	3,396	8,478	5,405
Total Storage Withdrawal	<u>9,686</u>	<u>4,071</u>	<u>14,642</u>	<u>6,369</u>
In-Basin Use of SW	4,074	675	6,164	964
Percent IBU of SW	85.8	14.2	86.5	13.5
<u>Sharing Unstored and Stored Water</u>				
Stored Water	1,735	874	4,932	1,896
Unstored Water for Export	<u>3,058</u>	<u>3,066</u>	<u>5,863</u>	<u>6,082</u>
Total Unstored and Stored				
Water	4,793	3,940	10,795	7,978
Percent Use of Unstored				
and Stored Water	54.9	45.1	57.5	42.5

TABLE 5

End of Period Storage - 1980
(1,000 Acre-Feet)

<u>Reservoir</u>	<u>Oct 1931</u>	<u>Oct 1934</u>	<u>Minimum Operating Level</u>
<u>CVP</u>			
Clair Engle	832	554	313
Whiskeytown	203	203	50
Shasta	1,494	3,128	500
Folsom	148	384	88
San Luis	281	422	38
Total	<u>2,958</u>	<u>4,691</u>	<u>989</u>
<u>SWP</u>			
Oroville	1,186	703	852
San Luis	42	42	42
Total	<u>1,228</u>	<u>745</u>	<u>894</u>

EXHIBIT B

Operation study USCAL-2-82 and the technical explanation contained in this report are the basis for Exhibit B-1 to the COA. 1980 level annual water supplies are those contained in Tables 2 and 3. Use of water in the Delta and for outflow is the average amount during the critical period for Delta consumptive use, carriage water and required Delta outflow.

Exports for Cross Valley Canal (CVP) were added to San Luis service area demands in Study No. 3 (column 124) but rely on transport through State Water Project facilities. Study No. 3 also reflects a May - July pumping restriction to minimize diversion of young striped bass and the subsequent "wheeling" of CVP water by the Delta Pumping Plant and California Aqueduct (column 123).

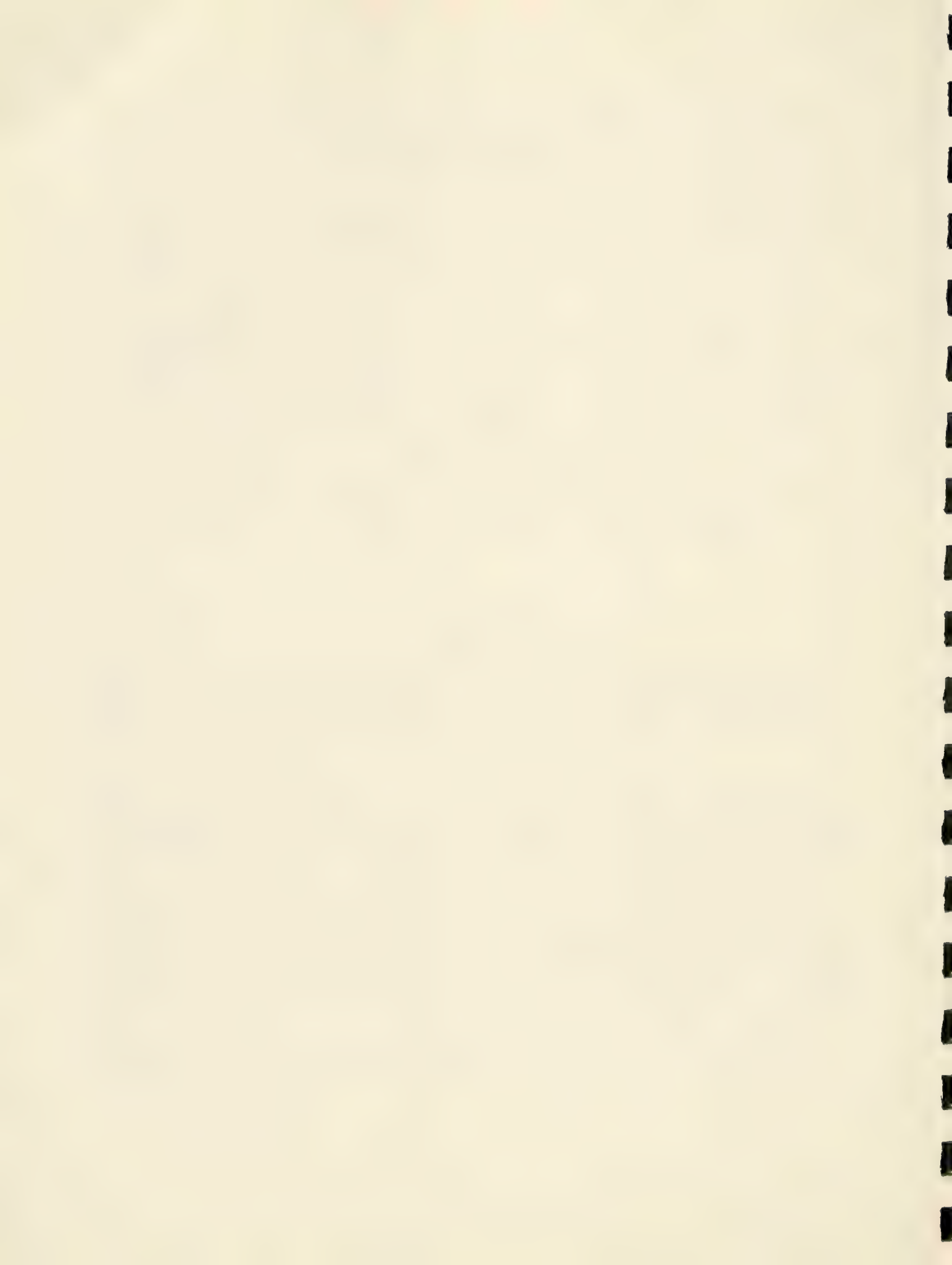
Incremental supply remaining available to the CVP in the 1980 level study was calculated by dividing the remaining storage in Clair Engle, Whiskeytown, Shasta, Folsom and San Luis (CVP) at the end of October 1931, from Study No. 3 (2,304 TAF) less minimum operating level of 989 TAF by a factor of 3.24. Each 324 acre-feet of remaining storage is capable of providing an annual supply of 100 acre-feet.

Exhibit B-2 to the COA was prepared in a similar manner as described above but using the results of study USCAL-3-82.

APPENDIX A

1980 Operation Study

USCAL-2-82



CLAIR ENGLE RESERVOIR
(STUDY #1 & #2)

WHISKEYTOWN RESERVOIR
(STUDY #1 & #2)

MONTH	INFLW RELEASE (1)	(2)	EVAP (3)	EDM STORAGE (4)	ACCR TO LEWISTH (5)	FLOW BELOW LEWISTN (6)	EXPORT TC CARR PH (7)	CLEAR CREEK INFLW (9)	EVAP (10)	CLEAR CREEK RELEASE (11)	EDM STORAGE (12)	EXPORT TO KESWICK (13)	STORED WATER (14)	STORAGE WTHDRWL (15)
1927-28														
OCT	12	107	2	2094	0	18	89	2	0	5	203	121	0	124
NOV	73	220	-3	1950	4	34	190	13	0	8	203	195	0	190
DEC	41	147	-6	1850	2	21	128	6	0	10	203	124	0	128
JAN	78	32	0	1896	4	21	15	21	0	5	203	31	0	15
FEB	127	29	0	1994	6	20	15	28	0	3	203	40	0	15
MAR	217	25	0	2186	11	21	15	49	0	3	203	61	0	15
APR	187	37	0	2336	9	27	19	20	0	4	238	0	16	0
MAY	194	76	8	2448	10	27	59	12	1	6	238	64	0	58
JUN	48	49	8	2439	2	21	30	3	2	7	238	24	0	28
JUL	17	180	11	2265	1	31	150	2	2	8	238	142	0	148
AUG	7	130	9	2083	1	31	150	0	2	4	238	144	0	148
SEPT	6	110	6	1967	1	27	90	1	1	5	238	85	0	89
TOTAL	1007	1138	33		51	299	950	157	8	68		1031	16	958
1928-29														
OCT	9	109	1	1866	0	19	90	1	1	4	203	121	0	124
NOV	22	49	-3	1842	2	21	30	3	0	9	203	24	0	30
DEC	25	50	-5	1822	1	21	30	3	0	9	203	24	0	30
JAN	28	34	0	1816	2	21	15	7	0	7	203	15	0	15
FEB	45	33	0	1828	2	20	15	9	0	5	203	19	0	15
MAR	80	29	0	1879	4	18	15	20	0	4	203	31	0	15
APR	75	39	0	1915	4	18	25	14	0	5	237	0	9	0
MAY	139	41	6	2007	7	18	30	8	1	7	238	29	0	28
JUN	57	46	7	2011	2	18	30	4	1	8	238	25	0	29
JUL	14	167	10	1848	1	18	150	1	2	7	238	142	0	148
AUG	5	167	6	1676	1	18	150	0	2	4	238	144	0	148
SEP	4	158	5	1569	0	18	90	1	2	5	238	84	0	88
TOTAL	503	972	29		26	228	670	71	9	74		658	9	670
1929-30														
OCT	7	107	1	1468	1	18	90	1	1	4	203	121	0	124
NOV	7	48	-2	1429	0	18	30	1	0	7	203	24	0	30
DEC	146	41	-5	1539	7	18	30	29	0	6	203	53	0	30
JAN	39	35	0	1543	2	22	15	10	0	6	203	19	0	15
FEB	116	27	0	1632	6	18	15	25	0	4	203	36	0	15
MAR	145	29	0	1748	7	21	15	23	0	3	203	35	0	15
APR	152	42	0	1858	8	27	23	17	0	5	238	0	12	0
MAY	98	52	5	1899	5	27	30	5	1	7	238	27	0	29
JUN	41	48	7	1885	3	21	30	3	2	7	238	24	0	28
JUL	12	180	10	1707	1	31	150	1	2	7	238	142	0	148
AUG	6	161	8	1524	0	31	150	0	2	4	238	144	0	148
SEP	6	117	5	1408	0	27	90	1	0	5	238	86	0	90
TOTAL	775	907	23		40	279	668	116	8	65		711	12	672

CLAIF ENGLE RESERVOIR
(STUDY #1 & #2)

WHISKEYTOWN RESERVOIR
(STUDY #1 & #2)

MONTH	INFLOW	RELEASE	EVAP	EOM STORAGE	ACCR TO LEWISTN	FLOW BELOW LEWISTN	EXPORT TO CARR PH	CLEAR CREEK INFLOW	EVAP	CLEAR CREEK RELEASE	EOM STORAGE	EXPORT TO KESWICK	STORED WATER	STORAGE WITHDRWML
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(10)	(11)	(12)	(13)	(14)	(15)
1930-31														
OCT	7	108	1	1306	1	19	50	1	1	4	203	121	0	124
NOV	10	51	-2	1267	0	21	30	1	0	7	203	24	0	30
DEC	14	50	-4	1235	1	21	30	1	0	7	203	24	0	30
JAN	32	34	0	1233	2	21	15	8	0	6	203	17	0	15
FEB	40	33	0	1240	2	20	15	9	0	6	203	18	0	15
MAR	60	20	0	1300	4	9	15	20	0	4	203	31	0	15
APR	63	31	0	1352	4	9	26	14	1	4	238	0	10	0
MAY	62	36	4	1374	3	9	30	4	1	7	238	26	0	29
JUN	39	43	6	1364	2	15	30	3	1	6	238	26	0	29
JUL	4	165	8	1200	0	15	150	1	2	6	238	143	0	148
AUG	3	164	6	1033	1	15	150	0	2	3	238	145	0	148
SEP	3	102	4	930	0	12	90	0	2	3	238	85	0	88
TOTAL	382	837	23		20	186	671	62	10	63		660	10	671
1931-32														
OCT	8	105	1	832	0	15	90	1	0	3	203	123	0	125
NOV	10	42	-2	802	1	13	30	1	0	5	203	26	0	30
DEC	21	38	-3	788	1	9	30	2	0	6	203	26	0	30
JAN	30	24	0	794	1	10	15	7	0	5	203	17	0	15
FEB	38	23	0	809	1	9	15	8	0	5	203	18	0	15
MAR	164	16	0	957	8	9	15	25	0	3	203	37	0	15
APR	118	27	0	1048	6	9	24	15	0	4	238	0	11	0
MAY	197	29	4	1212	10	9	30	12	0	5	238	37	0	30
JUN	73	41	5	1239	4	15	30	5	2	6	238	27	0	28
JUL	17	164	7	1085	1	15	150	2	2	7	238	143	0	148
AUG	6	164	6	921	1	15	150	0	2	3	238	145	0	148
SEP	4	102	3	820	0	12	90	1	2	4	238	85	0	88
TOTAL	686	775	21		34	140	669	79	8	56		684	11	672
1932-33														
OCT	5	104	1	720	1	15	90	1	1	3	203	122	0	124
NOV	15	42	-1	694	1	13	30	2	0	6	203	26	0	30
DEC	16	39	-3	674	0	9	30	2	0	6	203	26	0	30
JAN	16	25	0	665	0	10	15	3	0	5	203	13	0	15
FEB	17	23	0	659	1	9	15	4	0	6	203	13	0	15
MAR	129	17	0	771	7	9	15	22	0	2	203	35	0	15
APR	179	21	0	929	9	9	21	19	1	4	238	0	15	0
MAY	163	31	3	1058	8	9	30	9	0	5	238	34	0	30
JUN	170	36	5	1193	9	15	30	12	2	5	238	35	0	28
JUL	33	163	7	1056	2	15	150	3	2	8	238	143	0	148
AUG	9	165	6	894	0	15	150	1	2	4	238	145	0	148
SEP	6	101	3	796	1	12	90	1	1	4	238	86	0	89
TOTAL	764	767	21		39	140	666	79	9	58		670	15	672

CLAIR ENGLE RESERVOIR
(STUDY #1 & #2)

WHISKEYTOWN RESERVOIR
(STUDY #1 & #2)

MONTH	INFLOW	RELEASE	EVAP	EOM STORAGE	ACCR TO LEWISTN	FLOW BELOW LEWISTN	EXPORT TO CARR PH	CLEAR CREEK INFLOW	EVAP	CLEAR CREEK RELEASE	EOM STORAGE	EXPORT TO KESWICK	STORED WATER	STORAGE WITHDRWL
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(10)	(11)	(12)	(13)	(14)	(15)
1933-34														
OCT	7	105	1	697	0	15	90	1	0	3	203	123	0	125
NOV	9	42	-1	665	1	13	30	1	0	5	203	26	0	30
DEC	27	38	-3	657	1	9	30	5	0	7	203	28	0	30
JAN	76	21	0	712	4	10	15	20	0	3	203	32	0	15
FEB	102	19	0	795	5	9	15	21	0	3	203	33	0	15
MAR	168	15	0	948	9	9	15	25	0	3	203	37	0	15
APR	140	27	0	1061	7	9	25	14	0	4	238	0	10	0
MAY	76	35	4	1098	4	9	30	4	1	6	238	27	0	29
JUN	27	44	5	1076	1	15	30	2	2	5	238	25	0	28
JUL	9	165	7	913	0	15	150	1	2	6	238	143	0	148
AUG	5	165	5	748	0	15	150	0	2	3	238	145	0	148
SEP	4	102	3	647	0	12	90	1	2	4	238	85	0	88
TOTAL	650	778	21		32	140	670	95	9	52		704	10	671
1934-35														
OCT	13	105	1	554	0	15	90	2	0	4	203	123	0	125
NOV	79	39	-1	595	4	13	30	15	0	6	203	39	0	30
DEC	53	36	-3	615	3	9	30	8	0	7	203	31	0	30

SHASTA RESERVOIR
(STUDY #1)

SHASTA RESERVOIR
(STUDY #2)

SHASTA RESERVOIR
(STUDY #3)

MONTH INFLOW RELEASE EVAP STORAGE EDM LOCAL SPP CP PH KESWICK TOTAL KESWICK MANDA- MOD TO REVISED KESWICK MOD TO REVISED REVISED
(16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (25) (27) (28) (29) (30)

1927-23

OCT	206	222	3	3459	1	121	342	307	0	3459	342	337	0	3459	342
NOV	452	659	0	3252	1	145	853	298	0	3252	853	298	0	3252	853
DEC	342	231	0	3363	0	124	355	307	0	3363	355	307	0	3363	355
JAN	460	215	0	3608	0	31	246	246	0	3608	246	246	0	3608	246
FEB	624	374	0	3863	0	40	414	222	0	3863	414	222	0	3863	414
MAR	951	649	0	3965	0	61	910	246	0	3965	910	246	0	3965	910
APR	765	238	3	4469	0	0	238	238	0	4469	238	238	0	4469	238
MAY	391	396	13	4471	0	64	460	460	0	4471	460	460	0	4471	460
JUN	245	667	16	4034	0	24	691	565	32	4002	723	565	33	3969	726
JUL	220	428	19	3407	0	142	970	667	0	3375	970	667	115	3227	1085
AUG	196	443	15	3124	0	144	607	567	17	3075	624	567	28	2899	652
SEP	180	249	11	3009	0	85	374	374	0	2960	374	374	11	2773	365
TOTAL	5042	5431	80	1031	2	1031	6460	4497	49	6509	4497	4497	187	6696	

1928-29

OCT	197	173	4	3029	1	121	293	293	34	2946	327	293	3	2756	330
NOV	237	215	0	3051	1	24	236	238	0	2968	238	238	0	2778	238
DEC	256	222	0	3085	0	24	246	246	0	3002	246	246	0	2812	246
JAN	269	231	0	3123	0	15	246	246	0	3040	246	246	0	2850	246
FEB	369	203	0	3289	0	19	222	144	-78	3284	144	144	0	3094	144
MAR	372	215	0	3446	0	31	246	141	141	3441	246	141	4	3247	290
APR	397	390	2	3451	0	0	390	348	128	3318	518	348	24	3100	542
MAY	320	476	11	3284	0	29	505	505	0	3151	505	505	0	2933	505
JUN	230	450	7	3048	0	25	464	484	0	2915	484	484	3	2694	487
JUL	189	691	16	2529	0	142	833	589	-100	2496	733	588	85	2190	818
AUG	175	425	13	2266	0	144	549	486	-62	2295	507	486	27	1962	534
SEP	160	260	9	2163	0	84	344	344	46	2146	390	344	11	1802	401
TOTAL	3176	3950	62	658	2	658	4616	4063	-32	4584	4063	4063	157	4741	

1929-30

OCT	179	137	4	2201	1	121	257	257	111	2073	368	257	3	1726	371
NOV	176	173	3	2201	1	24	156	196	233	1840	429	176	0	1493	429
DEC	697	150	0	2749	0	53	203	203	0	2387	203	203	0	2040	203
JAN	144	144	0	2936	0	19	203	203	0	2602	203	203	0	2255	203
FEB	554	108	0	3391	0	36	144	144	0	3030	144	144	0	2683	144
MAR	673	106	0	3958	0	35	141	141	0	3597	141	141	0	3250	141
APR	415	200	3	4171	0	0	200	200	0	3810	200	200	86	3368	295
MAY	317	350	11	4117	0	27	387	387	0	3756	387	387	0	3314	387
JUN	212	558	15	3757	0	24	582	471	37	3359	619	471	-39	2956	580
JUL	168	751	18	3176	0	142	893	588	0	2778	893	588	107	2268	1000
AUG	175	449	15	2887	0	144	593	486	17	2472	610	486	27	1935	637
SEP	175	208	3	2851	0	86	294	294	12	2424	306	294	11	1876	317
TOTAL	4144	3384	72	711	2	711	4093	3570	410	4503	3570	3570	195	4707	

SHASTA RESERVOIR (STUDY #1)

SHASTA RESERVOIR (STUDY #2)

SHASTA RESERVOIR (STUDY #3)

MONTH	INFLOW	RELEASE	EVAP	EDM STORAGE	LOCAL DEMAND	SPR PH INFLOW	KESWICK TOTAL RELEASE	KESWICK MANDA-TORY	REVISED KESWICK MANDA-TORY RELEASE	MOD TO REVISED KESWICK MANDA-TORY RELEASE	SHASTA STORAGE RELEASE	MOD TO REVISED SHASTA STORAGE RELEASE	SHASTA RESERVOIR (STUDY #1)			SHASTA RESERVOIR (STUDY #2)			SHASTA RESERVOIR (STUDY #3)		
													(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
1930-31																					
OCT	143	126	5	2903	1	121	246	246	39	2437	285	246	3	1886	288						
NOV	146	228	0	2874	1	24	238	238	43	2315	331	238	0	1764	331						
DEC	186	222	0	2840	0	24	246	246	190	2091	436	246	0	1540	436						
JAN	271	229	0	2882	0	17	246	246	0	2133	246	246	0	1582	246						
FEB	264	126	6	3020	0	18	144	144	0	2271	144	144	0	1720	144						
MAR	364	143	0	3241	0	31	174	174	0	2492	174	174	9	1932	183						
APR	242	408	6	2969	0	11	508	432	11	2209	519	432	15	1634	534						
MAY	196	324	8	2833	0	26	350	350	0	2073	350	350	17	1481	367						
JUN	171	332	5	2667	0	26	358	359	0	1907	358	358	12	1303	370						
JUL	159	343	14	2259	0	143	696	472	-140	1659	536	472	20	1035	556						
AUG	155	344	11	2059	0	145	489	401	-68	1547	401	401	18	905	419						
SEP	152	223	7	1951	0	85	338	339	0	1439	338	338	0	797	338						
TOTAL	2531	1375	56	4033	2	640	4033	3643	65	4118	3645	3645	94	4212	4212						
1931-32																					
OCT	174	119	0	2006	1	123	241	241	0	1494	241	241	0	852	241						
NOV	175	171	0	2010	1	26	196	196	89	1409	285	196	0	767	285						
DEC	407	177	0	2240	0	26	203	203	0	1639	203	203	0	997	203						
JAN	343	146	0	2397	0	17	203	203	0	1796	203	203	0	1154	203						
FEB	313	126	0	2584	0	18	144	144	0	1983	144	144	0	1341	144						
MAR	613	104	0	3093	0	37	141	141	0	2492	141	141	0	1850	141						
APR	421	338	2	3174	0	0	338	338	-43	2616	295	293	0	1974	295						
MAY	445	344	2	3273	0	37	341	381	-57	2772	324	324	0	2130	324						
JUN	227	475	12	3013	0	27	502	502	-74	2586	428	426	-2	1946	426						
JUL	162	345	15	2515	0	143	808	584	-249	2377	519	498	100	1637	619						
AUG	163	362	12	2304	0	145	507	475	-63	2229	444	411	23	1466	467						
SEP	153	222	8	2187	0	85	347	347	-18	2130	329	331	0	1367	329						
TOTAL	3616	1529	51	4011	2	684	4011	3755	-455	3556	3411	3411	121	3677	3677						
1932-33																					
OCT	160	143	5	2194	1	122	269	269	-18	2155	251	251	0	1392	251						
NOV	179	173	0	2200	1	26	198	198	0	2161	198	198	0	1398	198						
DEC	188	177	0	2211	0	26	203	203	0	2172	203	203	0	1409	203						
JAN	227	140	0	2248	0	13	203	203	0	2209	203	203	0	1446	203						
FEB	218	141	0	2335	0	13	144	144	0	2296	144	144	0	1533	144						
MAR	783	104	0	3017	0	35	141	141	0	2978	141	141	7	2208	148						
APR	480	344	7	3146	0	34	344	344	-43	3150	651	299	15	2365	316						
MAY	410	450	1	3095	0	34	494	494	-57	3156	437	437	-12	2383	425						
JUN	278	511	12	2850	0	35	546	546	-71	2982	475	470	6	2203	481						
JUL	187	343	14	2340	0	143	826	590	-322	2794	504	504	62	1953	566						
AUG	164	345	11	2108	0	145	530	413	-100	2662	430	413	22	1799	452						
SEP	154	257	7	1968	0	86	353	353	-18	2560	335	337	0	1697	335						
TOTAL	3433	1575	57	4251	2	678	4251	3962	-629	3972	3600	3600	100	3722	3722						

SHASTA RESERVOIR
(STUDY #1)

SHASTA RESERVOIR
(STUDY #2)

SHASTA RESERVOIR
(STUDY #3)

MONTH	INFLOW	RELEASE	EVAP	STORAGE	LOCAL DEMAND	SPR CR PH INFLOW	KESWICK TOTAL RELEASE	MANDA - TORY	KESWICK MANDA - TORY	MOD TO SHASTA RELEASE	REVISED KESWICK RELEASE	SHASTA STORAGE	MANDA - TORY	REVISED KESWICK MANDA - TORY	MOD TO SHASTA RELEASE	REVISED KESWICK RELEASE
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)
1933-34																
OCT	172	141	0	2019	1	123	263	263	-18	2609	245	245	0	1746	245	
NOV	169	177	2	2009	1	26	202	202	U	2599	202	202	0	1736	202	
DEC	324	175	0	2158	0	28	203	203	0	2748	203	203	0	1885	203	
JAN	477	171	0	2464	0	32	203	203	0	5054	203	203	0	2191	203	
FEB	492	111	0	2845	0	33	144	144	0	3435	144	144	0	2572	144	
MAR	454	104	0	3195	0	37	141	141	0	3785	141	141	9	2913	150	
APR	330	352	2	3171	0	0	352	352	-43	3804	309	307	15	2917	324	
MAY	253	433	7	2984	0	27	460	460	-57	3674	403	403	17	2770	420	
JUN	183	472	10	2685	0	25	497	442	-125	3500	372	366	19	2577	391	
JUL	163	647	14	2187	0	143	790	564	-306	3308	484	478	20	2365	504	
AUG	152	359	10	1970	0	145	504	464	-101	3192	403	400	22	2227	425	
SEP	147	270	7	1634	0	85	361	361	-18	3074	343	345	0	2109	343	
TOTAL	3316	3418	52		2	704	4120	3799	-668		3452	3437	102		3524	

1934-35

OCT	162	126	0	1870	1	123	248	248	-18	3128	230	230	0	2163	230
NOV	306	129	0	2047	1	39	167	167	13	3292	180	167	0	2327	180
DEC	240	97	0	2188	0	31	130	130	134	3299	264	130	0	2334	264

FOLSOM RESERVOIR (STUDY #1)

FOLSOM RESERVOIR (STUDY #2)

FOLSOM RESERVOIR (STUDY #3)

MONTH	INFLW RELEASE (31)	EVAP (33)	EOM STORAGE (34)	LOCAL DEMAND (35)	FOLSOM SOUTH CANAL (36)	NIMBUS RELEASE (37)	MODIF TO RELEASE (38)	REVISED STORAGE (39)	REVISED NIMBUS RELEASE (40)	SHASTA-FOLSOM STORAGE WITHDRAWL (41)	SHASTA FOLSOM STORED WATER (42)	MODIF TO RELEASE STORAGE (43)	REVISED FOLSOM STORAGE (44)	REVISED NIMBUS RELEASE (45)
1927-28														
OCT	110	1.3	598	7	4	92	0	558	92	9	0	0	598	92
NOV	183	161	600	5	4	172	0	600	172	205	0	0	600	172
DEC	167	170	600	5	3	162	0	600	162	0	108	0	600	162
JAN	168	99	671	4	3	92	0	671	92	0	314	0	671	92
FEB	159	131	700	3	3	125	0	700	125	0	283	0	700	125
MAR	908	42	716	3	4	865	0	716	865	0	118	0	716	865
APR	414	118	1010	6	5	107	0	1010	107	0	723	0	1010	107
MAY	246	242	1010	8	4	230	0	1010	230	0	1	0	1010	230
JUN	97	203	897	10	5	168	0	897	168	559	0	0	897	168
JUL	79	231	737	11	5	215	0	737	215	750	0	0	737	215
AUG	85	199	616	10	5	164	0	616	164	399	0	0	616	164
SEP	96	102	605	8	5	89	0	605	89	110	0	0	605	89
TOTAL	2714	2571	80	2541	50	2541	0	2541	2541	2042	1547	0	2541	2541
1928-29														
OCT	72	103	571	7	4	92	0	571	92	41	0	0	571	92
NOV	92	49	565	5	4	89	0	565	89	0	16	0	565	89
DEC	94	100	562	5	3	92	0	562	92	0	28	0	562	92
JAN	69	99	554	4	3	92	0	554	92	0	28	0	554	92
FEB	127	89	593	3	3	83	-14	607	69	0	296	0	607	69
MAR	154	99	648	3	4	52	0	662	92	0	212	0	662	92
APR	156	100	702	6	5	89	0	716	89	65	0	0	716	89
MAY	220	104	819	8	4	92	45	788	137	79	0	-45	833	92
JUN	147	132	804	10	5	141	-65	838	76	173	0	52	831	128
JUL	89	202	623	11	5	246	0	657	246	576	0	0	650	246
AUG	76	241	432	10	5	246	0	466	246	373	0	0	459	246
SEP	63	104	387	9	5	91	86	335	177	267	0	0	328	177
TOTAL	1385	1575	80	1445	50	1445	52	1497	1497	1574	580	7	1504	1504
1929-30														
OCT	52	60	377	7	4	49	0	325	49	77	0	0	316	49
NOV	68	57	388	5	4	48	0	336	48	219	0	0	329	48
DEC	179	57	512	5	3	49	0	460	49	0	669	0	453	49
JAN	179	50	637	4	3	49	0	585	49	0	338	0	578	49
FEB	153	103	688	3	3	57	-52	688	45	0	530	0	681	45
MAR	300	120	660	3	4	121	0	660	121	0	739	-7	660	121
APR	254	108	1010	6	5	91	0	1010	91	0	368	0	1010	91
MAY	174	108	1010	8	4	156	0	1010	156	37	0	0	1010	156
JUN	131	144	940	10	5	179	0	940	179	445	0	0	940	179
JUL	87	252	757	11	5	246	0	757	246	739	0	0	757	246
AUG	82	199	633	10	5	164	0	633	164	408	0	0	633	164
SEP	82	102	609	8	5	69	92	517	181	157	0	0	517	181
TOTAL	1741	1498	80	1358	50	1358	40	1398	1398	2082	2644	-7	1391	1391

MONTH	FOLSOM RESERVOIR (STUDY #1)				FOLSOM RESERVOIR (STUDY #2)				FOLSOM RESERVOIR (STUDY #3)					
	INFLOW P/LEASE	EVAP	ENH STORAGE	LOCAL DEMAND	FOLSOM SOUTH CANAL	NIMPUS RELEASE	MODIF TO RELEASE	REVISED FOLSOM STORAGE	REVISED NIMPUS RELEASE	SHASTA- FOLSOM STORAGE	SHASTA FOLSOM STORED WATER	MODIF TO RELEASE	REVISED FOLSOM STORAGE	REVISED NIMPUS RELEASE
	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)
1930-31														
OCT	63	103	3	566	7	4	92	0	474	92	22	0	0	474
NOV	92	98	0	560	5	4	89	0	468	89	128	0	0	468
DEC	81	100	-3	544	5	3	92	0	452	92	243	0	0	452
JAN	103	99	-2	550	4	3	92	0	452	92	0	46	0	452
FEB	103	99	-1	565	3	3	83	0	473	83	0	152	0	473
MAR	140	99	0	606	3	4	92	0	514	92	0	262	0	514
APR	120	102	2	422	6	7	89	0	530	89	259	0	0	530
MAY	103	106	5	614	8	6	92	0	522	92	131	0	0	522
JUN	67	164	5	508	10	8	150	-12	428	138	250	0	12	416
JUL	73	204	6	371	11	9	164	0	291	184	365	0	0	279
AUG	74	202	4	239	10	8	184	0	159	184	229	0	0	147
SEP	62	61	2	238	8	5	48	0	158	48	100	0	0	146
TOTAL	1081	1431	21	1081	80	64	1287	-12	1275	1275	1727	460	12	1287
1931-32														
OCT	52	61	1	228	7	5	49	0	148	49	0	0	0	136
NOV	79	58	0	249	5	5	48	0	169	48	64	0	0	157
DEC	195	58	-2	388	5	4	49	0	308	49	0	367	0	296
JAN	199	57	-2	532	4	4	49	0	492	49	0	299	0	480
FEB	327	102	-1	758	3	4	95	0	678	95	0	412	0	666
MAR	258	158	0	858	3	5	150	0	778	150	0	639	7	759
APR	276	224	2	908	6	5	213	0	828	213	0	178	15	794
MAY	420	312	6	1010	8	4	300	0	930	300	0	266	-114	1010
JUN	259	252	7	1010	10	5	237	0	930	237	167	0	0	1010
JUL	127	323	9	805	11	5	350	-30	755	277	350	0	30	805
AUG	84	292	7	595	10	5	277	0	545	277	339	0	0	595
SEP	103	102	5	591	8	5	69	0	541	69	90	0	0	591
TOTAL	2384	1999	32	2384	80	56	1863	-30	1833	1833	1020	2131	-62	1771
1932-33														
OCT	89	103	3	574	7	4	52	0	524	92	0	16	0	574
NOV	85	98	0	561	5	4	89	0	511	89	7	0	0	561
DEC	91	100	-3	555	5	3	92	0	505	92	0	2	0	555
JAN	103	99	-2	561	4	3	92	0	511	92	0	41	0	561
FEB	85	75	-1	572	3	3	69	0	522	69	0	97	0	572
MAR	162	84	0	650	3	4	77	0	600	77	0	750	0	650
APR	195	85	2	758	6	5	74	0	708	74	0	289	0	758
MAY	237	89	5	901	8	4	77	0	851	77	0	155	0	901
JUN	221	108	7	1007	10	5	53	0	957	93	49	0	0	1007
JUL	95	293	9	800	11	5	277	0	750	277	372	0	0	800
AUG	63	292	7	584	10	5	277	0	534	277	330	0	0	584
SEP	66	96	4	548	8	5	85	0	498	65	127	0	0	548
TOTAL	1512	1524	31	1512	80	50	1394	0	1394	1394	885	1360	0	1394

FOLSOM RESERVOIR (STUDY #1) FOLSOM RESERVOIR (STUDY #2) FOLSOM RESERVOIR (STUDY #3)

MONTH	INFLOW RELEASE	EVAP	EQM STORAGE	LOCAL DEMAND	FOLSOM SOUTH CANAL	FOLSOM NIMBUS RELEASE	MODIF TO RELEASE	REVISED FOLSOM STORAGE	SHASTA FOLSOM STORAGE	SHASTA FOLSOM STORED WATER	MODIF TO RELEASE STORAGE	REVISED FOLSOM STORAGE	REVISED NIMBUS RELEASE		
	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)
1933-34															
OCT	56	88	2	514	7	4	77	0	464	77	0	17	0	514	77
NOV	88	83	0	519	5	4	74	0	419	74	0	0	0	469	74
DEC	151	85	-3	588	5	3	77	0	538	77	0	215	0	588	77
JAN	194	101	-2	687	4	3	94	0	637	94	0	433	0	687	94
FEB	170	100	-1	758	3	3	94	0	708	94	0	471	0	758	94
MAR	201	98	0	860	3	4	91	0	810	91	0	452	0	860	91
APR	161	85	2	933	6	5	74	0	803	74	0	96	0	933	74
MAY	51	127	6	895	8	4	115	-20	665	95	135	0	0	915	95
JUN	72	194	6	767	10	5	179	-60	797	119	226	0	0	847	119
JUL	62	203	8	548	11	5	277	-31	609	246	358	0	0	659	246
AUG	82	292	6	332	10	5	277	-31	444	246	284	0	0	494	246
SEP	83	87	4	304	8	5	74	0	396	74	135	0	0	446	74
TOTAL	1417	1633	28		80	50	1503	-142		1361	1141	1654	0		1361
1934-35															
OCT	51	60	3	292	7	4	49	0	384	49	0	45	0	434	49
NOV	97	57	0	332	5	4	48	0	424	48	0	234	0	474	48
DEC	90	57	-1	366	5	3	49	0	458	49	0	40	0	508	49

FEATHER RIVER
(STUDY #1)

OROVILLE RESERVOIR
(STUDY #2)

FEATHER RIVER
(STUDY #2)

OROVILLE RESERVOIR
(STUDY #3)

MONTH	FLOW W/3 SWP	INFLOW	REQ'D RELEASE	RELEASE TO DELTA	EVAP	ED4 STORAGE	STORAGE WITHDRAWL	STORCK WATER	MODIF TO FLOW	REVISED FLOW	MODIF TO RELEASE	REVISED EDM STORAGE			
	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	(57)	(58)	(59)	(60)
1927-28															
OCT	139	63	127	0	4	2932	64	0	65	204	0	2932	0	0	2932
NOV	366	260	106	121	-1	2966	0	33	-34	332	0	2966	0	121	2966
DEC	321	107	0	0	-5	3022	0	51	-51	270	0	3022	0	0	3022
JAN	545	263	96	120	-3	3072	0	47	-47	498	0	3072	0	120	3072
FEB	463	352	86	231	-1	3166	0	35	-37	423	0	3166	0	231	3166
MAR	2509	1217	104	1423	1	2757	313	0	293	2802	0	2797	0	1423	2797
APR	993	591	108	0	3	3277	0	483	-491	502	0	3277	0	0	3277
MAY	453	354	216	0	6	3407	0	136	-134	319	0	3407	0	0	3407
JUN	123	177	213	57	11	3303	93	0	90	213	-23	3326	34	34	3326
JUL	69	150	226	0	12	3215	76	0	71	160	92	3146	92	92	3146
AUG	95	111	211	35	11	3069	135	0	125	220	19	2981	19	54	2981
SEP	125	74	119	0	8	3016	45	0	46	171	0	2928	0	0	2928
TOTAL	6218	3770	1721	1987	46	723	765	6114	-164	88	2075				
1928-29															
OCT	131	52	131	0	4	2933	79	0	67	198	1	2844	1	1	2844
NOV	150	66	106	0	-1	2894	40	0	50	200	0	2805	0	0	2805
DEC	213	95	107	0	-5	2867	12	0	20	233	0	2798	0	0	2798
JAN	320	147	101	7	-3	2929	0	29	-29	291	-7	2847	0	0	2847
FEB	428	199	90	0	-1	3039	0	109	-101	327	0	2957	0	0	2957
MAR	366	233	108	0	1	3163	0	125	-120	266	0	3081	0	0	3081
APR	258	245	113	459	3	2633	327	0	329	587	6	2745	465	465	2745
MAY	264	283	221	172	5	2718	110	0	112	376	-10	2640	162	162	2640
JUN	165	177	215	99	9	2572	137	0	139	304	0	2494	0	99	2494
JUL	54	97	226	67	10	2366	196	0	138	192	0	2288	0	67	2288
AUG	50	85	212	44	9	2166	171	0	135	185	0	2108	0	44	2108
SEP	77	62	131	26	6	2085	95	0	96	173	0	2007	0	26	2007
TOTAL	2496	1741	1761	874	37	1167	273	3332	836	-10	864				
1929-30															
OCT	126	47	100	118	3	1911	171	0	129	255	0	1833	0	118	1833
NOV	47	42	76	184	-1	1644	218	0	230	277	0	1616	0	184	1616
DEC	531	742	265	55	-4	2120	0	422	-462	129	0	2042	0	55	2042
JAN	823	318	65	0	-2	2575	0	253	-227	596	0	2297	0	0	2297
FEB	287	365	135	0	0	2605	0	230	-226	67	0	2527	0	0	2527
MAR	1178	496	60	0	1	3042	0	438	-423	755	0	2964	0	0	2964
APR	773	479	111	179	3	3228	0	169	-202	571	12	3138	191	191	3138
MAY	498	346	219	68	6	3281	0	59	-58	430	-59	3250	9	9	3250
JUN	169	102	214	167	10	3074	197	0	201	370	-9	3052	158	158	3052
JUL	63	102	226	75	11	2464	199	0	156	216	10	2832	85	85	2832
AUG	84	97	212	45	10	2654	160	0	146	230	0	2662	0	45	2662
SEP	140	77	119	24	7	2621	66	0	68	208	0	2589	0	24	2589
TOTAL	4706	3297	1802	915	44	1011	1591	4104	-602	-46	869				

FEATHER RIVER
(STUDY #1)

OROVILLE RESERVOIR
(STUDY #2)

FEATHER RIVER
(STUDY #2)

OROVILLE RESERVOIR
(STUDY #3)

MONTH	FLOW W/O SWP		INFLW	REQ'D RELEASE	RELEASE TO DELTA	EVAP	EOM STORAGE		STORAGE WITHDRWL	STORED WATER	MODIF TO FLOW		REVISED FLOW	MODIF TO RELEASE		REVISED EOM STORAGE
	(46)	(47)					(48)	(49)			(50)	(51)		(52)	(53)	
1930-31																
OCT	129		55	99	42	4	2531	66	0	0	72	201	0	0	42	2499
NOV	135		78	66	12	-1	2512	20	0	0	37	172	0	0	12	2400
DEC	130		75	89	224	-4	2278	238	0	0	254	384	0	0	224	2246
JAN	292		178	78	0	-2	2380	0	100	0	-84	208	0	0	0	2348
FEB	321		169	81	48	-1	2421	0	40	0	-25	296	0	0	48	2389
MAR	378		246	79	324	1	2263	157	0	0	169	547	0	0	324	2231
APR	134		151	128	241	2	2063	178	0	0	194	328	0	0	241	2051
MAY	154		166	122	206	4	1917	162	0	0	159	313	0	0	206	1805
JUN	131		126	150	161	7	1725	185	0	0	146	277	0	0	161	1693
JUL	65		81	157	121	8	1520	197	0	0	131	196	0	0	121	1488
AUG	45		81	145	105	7	1344	169	0	0	133	178	0	0	105	1312
SEP	78		62	95	18	4	1269	51	0	0	56	134	0	0	18	1257
TOTAL	1992		1508	1309	1502	29	1443	1443	140	1242	3234	0	0	0	1502	
1931-32																
OCT	122		53	81	73	2	1186	101	0	0	78	200	0	0	73	1154
NOV	95		65	60	86	-1	1106	81	0	0	105	200	0	0	86	1074
DEC	79		222	190	0	-2	1140	0	32	0	-24	55	0	0	0	1108
JAN	828		248	49	0	-1	1340	0	199	0	-61	747	0	0	0	1308
FEB	527		225	46	0	-1	1520	0	179	0	-126	401	0	0	0	1488
MAR	352		441	103	84	0	1774	0	254	0	-222	130	0	0	84	1742
APR	570		466	108	348	2	1782	0	10	0	-28	542	0	0	348	1750
MAY	677		496	214	0	4	2060	0	282	0	-286	391	0	0	0	2046
JUN	293		265	212	48	8	2057	0	5	0	-3	290	0	37	85	1988
JUL	37		102	226	9	9	1915	133	0	0	105	142	0	61	70	1785
AUG	59		101	212	62	7	1735	173	0	0	149	208	0	0	62	1605
SEP	91		78	133	19	5	1656	74	0	0	75	166	0	0	19	1526
TOTAL	3730		2762	1634	729	32	562	719	961	-258	3472	0	0	98	827	
1932-33																
OCT	145		55	101	96	3	1511	142	0	0	82	227	0	0	96	1381
NOV	20		58	121	92	-1	1357	155	0	0	143	163	0	0	92	1227
DEC	107		72	90	131	-3	1211	149	0	0	178	285	0	0	131	1081
JAN	222		148	78	0	-1	1262	0	70	0	-36	186	0	0	0	1152
FEB	367		130	82	0	0	1330	0	48	0	-23	344	0	0	0	1200
MAR	93		249	224	39	0	1316	14	0	0	7	100	0	0	39	1186
APR	348		289	97	108	2	1358	0	84	0	-56	292	0	0	108	1268
MAY	338		319	119	155	3	1440	0	45	0	5	343	0	0	155	1310
JUN	247		238	148	156	6	1368	66	0	0	111	358	0	1	157	1237
JUL	25		167	156	33	7	1279	82	0	0	81	106	0	0	33	1148
AUG	48		88	137	43	6	1161	92	0	0	91	139	0	0	43	1050
SEP	85		65	82	2	4	1158	19	0	0	29	114	0	0	2	1027
TOTAL	2045		1818	1435	855	26	719	247	612	2657	856	1	1	856		

FEATHER RIVER
(STUDY #1)

OROVILLE RESERVOIR
(STUDY #2)

FEATHER RIVER
(STUDY #2)

OROVILLE RESERVOIR
(STUDY #3)

MONTH	FLOW 4/7 SWP	INFLOW	REQ'D RELEASE	RELEASE TO DELTA	EVAP	EOM STORAGE	STORAGE WTHORWL	STORIED WATER	MODIF TO FLOW	REVISED FLOW	MODIF TO RELEASE	REVISED EOM STORAGE			
	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	(57)	(58)	(59)	(60)
1933-34															
OCT	87	52	61	47	2	1060	76	0	77	164	0	47	0	47	949
NOV	78	54	69	78	0	987	93	0	113	191	0	78	0	78	856
DEC	68	156	160	44	-2	941	48	0	31	99	0	44	0	44	810
JAN	649	268	57	0	-1	1153	0	211	-182	467	0	0	0	0	1022
FEB	245	281	96	0	0	1338	0	165	-195	50	0	0	0	0	1207
MAR	490	311	61	0	0	1588	0	250	-237	253	0	0	0	0	1457
APR	370	237	98	95	2	1630	0	44	-30	340	0	95	0	95	1499
MAY	171	170	122	239	4	1435	191	0	172	343	0	239	0	239	1304
JUN	140	129	150	171	6	1237	192	0	134	274	0	171	0	171	1106
JUL	44	87	165	109	6	1044	187	0	131	179	0	109	0	109	913
AUG	65	87	138	118	5	870	169	0	145	210	0	118	0	118	739
SEP	60	63	92	13	3	825	42	0	47	137	0	13	0	13	694
TOTAL	2501	1895	1289	914	25		998	690	206	2707	0	914	0	914	
1934-35															
OCT	83	49	81	88	2	703	120	0	123	206	0	88	0	88	572
NOV	116	97	58	17	0	725	0	22	6	122	0	17	0	17	594
DEC	135	112	57	78	-2	704	23	0	69	204	0	78	0	78	573

DELTA BALANCE
(STUDY #1)

MONTH	KESWICK RELEASE	NIMBUS RELEASE	(61) . (62) . (63) . (64) . (65) . (66) . (67) . (68) . (69) . (70) . (71) . (72) . (73) . (74) . (75) .	SAC TO BASIN AC/DP	Joaquin RV AT VERNLIS	OTHER TRIB INFLOW	TOTAL DELTA INFLOW	CITY OF VALLEJO	CONTRA COSTA CANAL	DELTA MENDOTA CANAL	NET DELTA INFLOW	DELTA CU	REQ'D DELTA OUTFLOW	EXCESS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
1927-29															
OCT	342	92	(61)	228	130	173	965	1	7	96	861	68	252	541	793
NOV	853	172		706	148	122	2003	1	6	42	1954	107	268	1579	1847
DEC	355	162		688	144	126	1475	1	5	13	1456	160	240	1056	1296
JAN	246	92		996	151	66	1571	1	5	14	1551	49	160	1342	1502
FEB	414	125		1367	159	110	2175	1	5	68	2101	33	561	1507	2068
MAR	911	885		3799	241	424	6259	1	6	116	6136	37	222	5877	6099
APR	23F	107		1579	143	133	2201	1	7	171	2022	83	321	1618	1939
MAY	460	230		300	168	36	1194	1	9	200	984	104	394	486	880
JUN	691	188		-192	73	12	772	1	10	249	912	178	334	0	334
JUL	970	215		-327	72	10	940	0	11	283	646	246	400	0	400
AUG	607	134		-167	69	9	702	0	10	267	425	191	234	0	234
SEP	374	89		80	85	12	640	1	9	138	492	101	264	127	391
TOTAL	6460	2541		9059	1584	1253	20857	10	90	1657	19140	1357	3650	14133	17783
1928-29															
OCT	293	92		152	122	30	669	1	7	96	585	68	227	290	517
NOV	238	69		276	125	141	869	1	6	42	820	107	167	546	713
DEC	246	92		438	133	145	1054	1	5	13	1035	160	212	663	875
JAN	246	92		472	132	62	1004	1	5	14	984	49	187	748	935
FEB	222	83		812	122	84	1323	1	5	68	1249	33	157	1059	1216
MAR	246	92		551	112	91	1092	1	6	116	969	37	148	784	932
APR	390	89		141	93	47	760	1	7	171	581	93	498	0	498
MAY	505	92		-12	97	22	704	1	9	200	494	104	324	66	390
JUN	484	141		-118	74	54	635	1	10	249	375	178	197	0	197
JUL	833	246		-348	69	10	810	0	11	283	516	246	270	0	270
AUG	569	246		-192	64	9	646	0	10	267	419	191	228	0	228
SEP	344	91		-7	73	12	513	1	9	138	365	101	264	0	264
TOTAL	4016	1445		2165	1216	707	10149	10	90	1657	8392	1357	2879	4156	7035
1929-30															
OCT	257	49		109	115	10	540	1	7	96	436	68	252	116	368
NOV	196	48		69	62	3	378	1	6	42	329	107	215	7	222
DEC	205	49		1018	64	120	1454	1	5	13	1435	160	338	937	1275
JAN	203	49		1261	88	229	1630	1	5	14	1810	49	159	1602	1761
FFB	144	97		869	85	129	1324	1	5	68	1250	33	248	1101	1217
MAR	141	121		1699	85	206	2452	1	6	116	2329	37	248	2044	2292
APR	200	91		819	93	65	1268	1	7	171	1089	83	360	646	1006
MAY	387	156		350	75	29	957	1	9	200	787	104	311	372	683
JUN	562	179		-123	70	12	720	1	10	249	460	178	282	0	282
JUL	893	246		-346	69	10	872	0	11	283	578	246	332	0	332
AUG	593	184		-162	66	10	651	0	10	267	414	191	223	0	223
SEP	294	89		97	72	17	569	1	9	138	421	101	264	56	320
TOTAL	4093	1358		5860	944	840	13095	10	90	1657	11338	1357	3100	6881	9981

DELTA BALANCE
(STUDY #1)

SAN

MONTH	KESWICK RELEASE	NIMBUS RELEASE	(61)	(62)	(63)	(64)	(65)	(66)	OTHER TRIB INFLOW	TOTAL DELTA INFLOW	CITY OF VALLEJO	CONTRA COSTA CANAL	DELTA MENDOZA CANAL	NET DELTA INFLOW	DELTA CU	(72)	(73)	(74)	TOTAL DELTA OUTFLOW
1930-31																			
OCT	246	92	(61)	(62)	(63)	(64)	(65)	(66)	43	654	1	7	66	550	68	201	281	482	
NOV	238	39						57	659		1	6	42	610	107	176	327	503	
DEC	240	92						22	631		1	5	13	612	160	252	200	452	
JAN	246	72						174	1164		1	5	14	1144	49	266	829	1095	
FEB	144	33						92	902		1	5	68	828	33	144	651	795	
MAR	174	92						62	845		1	6	116	722	37	179	506	689	
APR	508	39						18	589		1	9	124	455	83	372	0	372	
MAY	353	92						52	631		1	11	156	463	104	338	21	359	
JUN	358	150						20	576		1	12	190	375	178	197	0	197	
JUL	696	104						10	740		0	14	218	516	245	270	0	270	
AUG	409	134						9	630		0	13	206	419	191	228	0	228	
SEP	339	48						12	468		1	11	102	354	101	214	39	253	
TOTAL	4533	1287						571	8507		10	104	1345	7048	1357	2837	2854	5691	

1931-32

OCT	241	49						21	553		1	9	61	482	68	177	237	414
NOV	195	48						76	585		1	8	47	529	107	187	235	422
DEC	203	49						389	1414		1	7	13	1393	160	293	940	1233
JAN	203	49						126	1600		1	7	14	1578	49	161	1368	1529
FEB	144	95						353	1484		1	6	68	1409	33	123	1253	1376
MAR	141	150						73	975		1	8	116	850	37	241	572	813
APR	338	213						56	1144		1	7	171	965	83	447	435	862
MAY	381	300						56	1388		1	9	200	1178	104	325	749	1074
JUN	502	317						20	825		1	10	249	565	178	238	149	387
JUL	808	277						10	836		0	11	283	542	246	296	0	296
AUG	507	277						9	691		0	10	267	414	191	223	0	223
SEP	347	89						12	536		1	9	138	388	101	264	23	287
TOTAL	4011	1803						1201	12031		10	101	1627	10293	1357	2975	5961	8936

1932-33

OCT	209	92						8	617		1	7	96	513	68	220	225	445
NOV	198	89						14	436		1	6	42	387	107	186	94	280
DEC	203	92						97	693		1	5	13	674	150	338	176	514
JAN	203	92						219	1141		1	5	14	1121	49	247	825	1072
FEB	144	69						47	862		1	5	68	788	33	146	609	755
MAR	141	77						115	639		1	6	116	716	37	183	496	679
APR	344	74						26	611		1	7	171	611	83	525	3	528
MAY	444	77						57	828		1	9	200	618	104	319	195	514
JUN	546	93						23	635		1	10	249	375	178	197	0	197
JUL	826	277						10	810		0	11	283	516	246	270	0	270
AUG	530	277						9	696		0	10	267	419	191	228	0	228
SEP	353	85						12	513		1	9	136	365	101	264	0	264
TOTAL	4251	1394						637	8860		10	90	1657	7103	1357	3123	2623	5746

DELTA BALANCE
(STUDY #1)

MONTH	KESWICK RELEASE	NIMBUS RELEASE	SAC TO BASIN AC/DP	SAM		OTHER TRIB INFLOW	TOTAL DELTA INFLOW	CITY OF VALLEJO	CONTRA COSTA CANAL	DELTA MENDOTA CANAL	NET DELTA INFLOW	DELTA CU	REQ'D DELTA OUTFLOW	EXCESS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
				JOAQUIN RV AT VERNLIS	RV AT VERNLIS										
	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)
1933-34															
OCT	263	77	62	92	43	557	1	7	96	453	58	252	133	385	
NOV	202	74	104	84	4	428	1	6	42	419	107	208	104	312	
DEC	203	77	428	73	202	983	1	5	13	964	160	332	472	804	
JAN	203	94	977	106	108	1488	1	5	14	1468	49	195	1224	1419	
FEB	144	94	585	133	209	1165	1	5	68	1091	33	127	931	1056	
MAR	141	91	697	90	28	1047	1	6	116	924	37	157	730	887	
APR	352	74	206	101	31	764	1	7	171	585	83	502	0	502	
MAY	460	115	-38	77	24	638	1	9	200	428	104	324	0	324	
JUN	497	179	-114	70	23	655	1	10	249	395	178	217	0	217	
JUL	790	277	-333	64	10	810	0	11	283	516	246	270	0	270	
AUG	504	277	-157	63	9	656	0	10	267	419	191	228	0	228	
SEP	361	74	-10	70	18	513	1	9	138	369	101	264	0	264	
TOTAL	4120	1503	2427	1025	709	9764	10	90	1657	8027	1357	3076	3594	6670	
1934-35															
OCT	248	49	88	86	25	456	1	7	96	392	68	252	72	324	
NOV	167	44	331	109	121	776	1	6	42	727	107	237	383	620	
DEC	130	40	316	93	128	716	1	5	13	697	150	226	311	537	

REVISED DELTA BALANCE
(STUDY #2)

MONTH	REVISED KESWICK RELEASE	REVISED NIMBUS RELEASE	SWP MOD TO FEATHER RIVER	CVP MOD TO SACT+D AC/DP	SACT+D S.J.R.V +TKIR	REVISED TOTAL INFLOW	REVISED CITY OF VALLEJO	REVISED CONTRA COSTA CANAL	DELTA CU	CVP EXPORT TRACY PP	SWP EXPORT DELTA PP	REQ'D DELTA OUTFLOW	(87) . (88) . (89) . (90) .	TOTAL DELTA OUTFLOW
	(76) . (77) . (78) . (79) . (80) . (81) . (82) . (83) . (84) . (85) . (86) . (87) . (88) . (89) . (90) .													
1927-28														
OCT	342	92	65	0	531	1030	1	7	68	265	393	252	44	296
NOV	853	172	-34	0	979	1969	1	6	107	252	381	268	954	1222
DEC	355	142	-51	0	958	1424	1	5	160	260	393	240	365	605
JAN	246	92	-47	0	1233	1524	1	5	49	259	393	225	554	817
FEB	414	125	-37	0	1634	2138	1	5	33	235	136	561	1167	1728
MAR	910	885	293	0	4464	6552	1	6	37	268	177	230	5833	6063
APR	236	107	-491	0	1656	1710	1	7	63	266	204	321	828	1149
MAY	460	230	-134	0	504	1060	1	9	104	278	265	394	0	403
JUN	723	196	90	0	-107	854	1	10	178	268	26	411	26	411
JUL	970	210	71	0	-245	1011	1	11	246	283	64	400	0	407
AUG	624	104	125	0	-89	844	1	10	191	284	115	234	10	244
SEP	374	89	46	0	177	686	1	9	101	201	110	264	0	264
TOTAL	6509	2541	-104	0	11896	20842	10	93	1357	3119	2697	3900	9754	13609
1928-29														
OCT	327	92	67	0	304	790	1	7	68	263	199	252	0	252
NOV	238	89	50	0	542	919	1	6	107	252	285	268	0	268
DEC	246	92	20	0	716	1074	1	5	160	260	305	338	0	343
JAN	246	92	-29	0	666	975	1	5	49	259	311	326	0	350
FEB	144	69	-101	0	1018	1130	1	5	33	235	355	300	177	501
MAR	240	92	-120	0	754	972	1	6	37	266	392	234	0	270
APR	518	89	329	0	281	1217	1	7	63	264	206	651	0	656
MAY	505	137	112	0	107	861	1	9	104	278	145	324	0	324
JUN	484	70	139	0	10	709	1	10	178	174	129	217	0	217
JUL	733	246	138	0	-269	848	1	11	246	183	132	270	0	276
AUG	507	240	135	0	-119	769	1	10	141	205	131	228	0	232
SEP	390	177	96	0	78	741	1	9	101	270	96	264	0	264
TOTAL	4584	1447	836	0	4688	11005	10	90	1357	2909	2686	3672	177	3953
1929-30														
OCT	368	49	129	0	234	780	1	7	68	265	187	252	0	252
NOV	429	48	230	0	134	841	1	6	107	252	192	268	0	283
DEC	203	49	-402	0	1202	1052	1	5	160	260	257	338	0	369
JAN	203	49	-227	0	1578	1603	1	5	49	259	393	326	554	896
FEB	144	49	-220	0	1083	1052	1	5	33	235	355	162	232	423
MAR	141	121	-423	0	2190	2029	1	6	37	268	393	362	940	1324
APR	200	91	-202	0	977	1066	1	7	63	266	290	398	0	419
MAY	387	156	-58	0	454	939	1	9	104	278	145	398	0	402
JUN	619	179	201	0	-41	958	1	10	178	268	129	355	0	372
JUL	893	240	156	0	-267	1028	0	11	246	283	132	332	0	356
AUG	610	104	146	0	-86	854	0	10	151	284	131	223	0	238
SEP	306	101	68	0	186	741	1	9	101	270	96	264	0	264
TOTAL	4503	1398	-602	0	7644	12943	10	90	1357	3188	2700	3678	1726	5598

REVISED DELTA BALANCE
(STUDY #2)

MONTH	(76) . (77) . (78) . (79) . (80) . (81) . (82) . (83) . (84) . (85) . (86) . (87) . (88) . (89) . (90) .	
	REVISED NIMBUS RELEASE	SWP MOD TO FEATHER RIVER
1930-31		
OCT	285	72
NOV	331	37
DEC	436	254
JAN	246	-84
FEB	144	-25
MAR	174	32
APR	519	194
MAY	350	159
JUN	358	146
JUL	236	131
AUG	401	133
SEP	358	56
TOTAL	4118	1242
1931-32		
OCT	241	78
NOV	285	105
DEC	203	-24
JAN	203	-81
FEB	144	-126
MAR	141	-222
APR	295	153
MAY	324	300
JUN	428	237
JUL	519	277
AUG	444	149
SEP	329	75
TOTAL	3556	1833
1932-33		
OCT	251	82
NOV	198	143
DEC	203	178
JAN	144	-36
FEB	144	-23
MAR	141	7
APR	301	5
MAY	437	77
JUN	475	93
JUL	504	277
AUG	433	277
SEP	335	65
TOTAL	3622	1394

MONTH	(76) . (77) . (78) . (79) . (80) . (81) . (82) . (83) . (84) . (85) . (86) . (87) . (88) . (89) . (90) .		CVP EXPORT TYPACY PP	SMP EXPORT DELTA PP	RELEASE FOR CARWAT	REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
	REVISED CITY OF VALLEJO	REVISED CONTRA CANAL						
1930-31								
OCT	765	7	250	187	0	252	0	252
NOV	789	6	252	154	1	268	0	269
DEC	1075	5	259	275	36	338	0	374
JAN	1060	5	259	393	38	326	9	373
FEB	877	5	235	297	8	298	0	306
MAR	1014	6	268	340	42	320	0	362
APR	794	9	179	186	0	336	0	336
MAY	750	11	156	166	0	352	0	352
JUN	712	12	170	134	0	217	0	217
JUL	719	14	58	131	0	270	0	270
AUG	683	13	118	133	0	228	0	228
SEP	524	11	121	76	0	214	0	214
TOTAL	9822	104	2326	2472	125	3419	9	3553
1931-32								
OCT	631	9	160	178	0	215	0	215
NOV	779	8	216	185	0	262	0	262
DEC	1390	7	260	393	0	354	0	359
JAN	1519	7	259	393	33	233	544	810
FEB	1358	6	235	355	0	174	554	728
MAR	753	8	268	152	0	287	0	287
APR	1122	9	179	374	0	476	0	476
MAY	839	12	267	309	31	416	0	447
JUN	839	12	267	26	0	355	0	355
JUL	732	14	68	71	1	332	0	333
AUG	861	13	285	131	18	223	0	241
SEP	617	11	194	96	0	214	0	214
TOTAL	11721	115	2639	2663	83	3541	1313	4537
1932-33								
OCT	701	9	221	187	0	215	0	215
NOV	579	8	47	154	0	262	0	262
DEC	871	7	74	275	0	354	0	354
JAN	1105	7	258	393	16	326	55	397
FEB	839	6	206	307	13	273	0	286
MAR	846	8	166	314	0	320	0	320
APR	740	9	199	168	0	280	0	280
MAY	851	11	240	138	0	357	0	357
JUN	766	12	262	88	8	217	0	225
JUL	679	14	68	81	0	270	0	270
AUG	771	13	248	84	7	228	0	235
SEP	548	11	165	56	0	214	0	214
TOTAL	9296	115	2154	2245	44	3316	55	3415

REVISED DELTA BALANCE
(STUDY #2)

MONTH	REVISED KESWICK RELEASE	REVISED HIMRUS RELEASE	SWP MOD TO FEATHER RIVER	CVP MOD TO SACT'D AC/DP	SAC'TO AC/DP S.J.R.V +TRIB	REVISED TOTAL INFLOW	REVISED CITY OF VALLFJO	REVISED CONTRA COSTA CANAL	DELTA CU	CVP EXPORT TRACY PP	SWP EXPORT DELTA PP	REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW	
	(76)	(77)	(78)	(79)	(80)	(81)	(82)	(83)	(84)	(85)	(85)	(87)	(88)	(89)	(90)
1933-34															
OCT	245	77	77	20	217	636	1	9	68	175	168	0	215	0	215
NOV	202	74	113	0	192	581	1	8	107	64	139	0	262	0	262
DEC	203	77	31	0	703	1014	1	7	160	231	261	0	354	0	354
JAN	203	94	-182	0	1191	1306	1	7	49	213	393	19	326	298	643
FEB	144	94	-195	0	927	970	1	6	33	168	355	0	198	209	407
MAR	141	91	-237	0	815	810	1	8	57	169	329	9	257	0	266
APR	309	74	-30	49	338	740	1	9	83	197	114	0	336	0	336
MAY	403	05	172	75	63	868	1	11	164	174	166	0	352	0	352
JUN	372	119	134	91	-21	655	1	12	178	153	134	0	217	0	217
JUL	464	240	131	110	-257	714	0	14	246	53	131	0	270	0	270
AUG	403	240	145	84	-85	793	0	13	191	216	133	12	228	0	240
SEP	343	74	47	24	78	566	1	11	101	163	76	0	214	0	214
TOTAL	3452	1361	206	453	4161	9633	10	115	1357	1976	2399	40	3229	507	3776
1934-35															
OCT	230	49	123	20	199	621	1	9	68	150	178	0	215	0	215
NOV	180	48	6	0	561	755	1	8	107	232	185	0	262	0	262
DEC	264	49	69	0	537	919	1	7	160	236	161	0	354	0	354

SAN LUIS RESERVOIR (CVP)
(STUDY #2)

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SAN LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EDM STORAGE	SWP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EDM STORAGE
. (91) . (92) . (93) . (94) . (95) . (96) . (97) . (98) . (99) . (100) . (101) . (102) . (103) . (104) . (105) .													
1927-23													
OCT	265	96	30	139	0	1	466	353	14	171	208	2	306
NOV	252	42	40	170	0	1	637	381	11	142	228	1	533
DEC	260	13	100	147	0	0	784	393	9	128	256	0	789
JAN	259	14	150	95	0	1	678	353	8	108	277	1	1065
FEB	235	68	100	67	0	1	944	136	9	124	3	1	1067
MAR	268	110	125	27	0	2	969	177	9	166	2	2	1067
APR	266	171	90	5	0	3	971	264	13	188	3	3	1067
MAY	274	200	135	-57	0	4	910	265	17	243	5	5	1067
JUN	268	249	195	-176	0	5	729	26	20	313	20	6	754
JUL	283	203	235	-235	0	5	469	64	20	356	-312	6	436
AUG	284	207	178	-161	0	4	324	115	20	343	-248	5	183
SEP	201	138	50	13	0	1	336	110	18	216	-124	3	56
TOTAL	3119	1657	1428	34	0	28		2657	168	2498	-9	35	

1928-29

OCT	263	96	30	137	0	1	472	159	14	171	14	2	68
NOV	252	42	40	170	0	1	641	285	11	142	132	1	199
DEC	260	13	100	147	0	0	788	305	9	128	168	0	367
JAN	259	14	150	95	0	1	882	311	8	108	195	1	561
FEB	235	68	100	67	0	1	948	355	8	124	223	1	783
MAR	266	116	125	25	0	2	971	392	9	166	217	2	998
APR	264	171	90	3	0	3	971	206	13	188	5	3	1000
MAY	276	200	135	-57	0	4	910	145	17	243	-115	5	880
JUN	174	249	195	-270	0	5	635	129	20	313	-204	6	670
JUL	183	283	235	-335	0	5	295	132	20	356	-244	6	420
AUG	205	207	178	-240	0	4	51	131	20	343	-232	5	183
SEP	270	138	50	82	0	1	132	96	18	216	-138	3	42
TOTAL	2909	1657	1428	-176	0	28		2666	167	2498	21	35	

1929-30

OCT	265	96	30	139	0	1	270	167	14	171	2	2	42
NOV	252	42	40	170	0	1	439	152	11	142	39	1	80
DEC	260	13	100	147	0	0	586	257	9	128	120	0	200
JAN	259	14	150	95	0	1	680	393	8	108	277	1	476
FEB	235	58	100	67	0	1	746	355	8	124	223	1	698
MAR	268	116	125	27	0	2	771	343	9	166	218	2	914
APR	266	171	90	5	0	3	773	290	13	188	89	3	1000
MAY	278	200	135	-57	0	4	712	145	17	243	-115	5	880
JUN	268	249	195	-176	0	5	531	129	20	313	-204	6	670
JUL	283	203	235	-235	0	5	291	132	20	356	-244	6	420
AUG	284	207	178	-161	0	4	126	131	20	343	-232	5	183
SEP	270	138	50	82	0	1	207	96	18	216	-138	3	42
TOTAL	3188	1657	1428	103	0	28		2700	167	2498	35	35	

SAN LUIS RESERVOIR (CVP)
(STUDY #2)

SAN LUIS RESERVOIR (SMP)
(STUDY #2)

MONTH	CVP TRACY P.P.		DELTA MENDOTA S.A.		SAN LUIS S.A.		SAN FELIPE		EOM STORAGE		SMP DELTA P.P.		SOUTH BAY AQUED		DOS AMIGOS DEMAND		SAN LUIS P.P.		EVAP		EOM STORAGE		
	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)	(103)	(104)	(105)	(106)	(107)	(108)	(109)	(110)	(111)	(112)	
1930-31																							
OCT	250	96	30	124	0	1	330	167	14	171	2	2	2	42									
NOV	252	42	40	170	0	1	459	154	11	142	1	1	1	42									
DEC	260	13	100	147	0	0	646	275	9	120	138	0	0	180									
JAN	259	14	100	145	0	1	790	353	8	108	277	1	1	456									
FEB	235	68	60	107	0	1	896	297	8	124	152	1	1	620									
MAR	268	116	75	77	0	2	971	343	9	149	182	2	2	800									
APR	179	124	55	0	0	3	968	186	13	170	3	3	3	800									
MAY	150	156	85	-85	0	4	879	166	17	214	-65	5	5	730									
JUN	170	190	120	-140	0	5	734	134	20	268	-154	6	6	570									
JUL	58	218	150	-310	0	5	419	131	20	305	-194	6	6	370									
AUG	118	206	110	-198	0	4	217	133	20	295	-182	5	5	183									
SEP	121	102	32	-13	0	1	203	76	18	196	-138	3	3	42									
TOTAL	2326	1345	957	24	0	28		2472	167	2270	35	35	35										

1931-32

OCT	160	61	20	79	0	1	281	178	14	162	2	2	2	42
NOV	216	47	20	149	0	1	429	185	11	135	39	1	1	80
DEC	260	13	30	217	0	0	646	293	9	120	264	0	0	344
JAN	259	14	100	145	0	1	790	353	8	103	282	1	1	625
FEB	235	68	60	107	0	1	896	355	8	116	231	1	1	855
MAR	268	116	75	77	0	2	971	152	9	166	-23	2	2	830
APR	179	124	55	0	0	3	968	374	13	188	173	3	3	1000
MAY	249	156	85	7	0	4	971	305	17	243	49	5	5	1044
JUN	267	190	120	-43	0	5	923	26	20	313	-307	6	6	731
JUL	66	218	150	-300	0	5	618	71	20	356	-305	6	6	420
AUG	285	206	110	-31	0	4	583	131	20	343	-232	5	5	183
SEP	194	102	32	60	0	1	642	96	18	216	-138	3	3	42
TOTAL	2639	1315	857	467	0	28		2663	167	2461	35	35	35	

1932-33

OCT	221	61	20	140	0	1	781	187	14	171	2	2	2	42
NOV	47	47	20	-20	0	1	760	154	11	142	1	1	1	42
DEC	74	13	30	31	0	0	791	275	9	128	138	0	0	180
JAN	258	14	100	144	0	1	934	393	8	108	277	1	1	456
FEB	205	68	100	38	0	1	971	307	8	124	175	1	1	630
MAR	166	116	50	0	0	2	969	314	9	133	172	2	2	800
APR	199	124	70	5	0	3	971	168	13	152	3	3	3	800
MAY	240	156	80	4	0	4	971	138	17	186	-65	5	5	730
JUN	262	190	120	-48	0	5	918	88	20	222	-154	6	6	570
JUL	68	218	150	-300	0	5	613	81	20	255	-194	6	6	370
AUG	246	206	110	-68	0	4	541	14	20	246	-182	5	5	183
SEP	165	102	30	33	0	1	573	56	18	176	-138	3	3	42
TOTAL	2154	1315	880	-41	0	28		2245	167	2043	35	35	35	

SAN LUIS RESERVOIR (CVP)
(STUDY #2)

SAN LUIS RESERVOIR (SMP)
(STUDY #2)

MONTH	CVP TRACY P.P.		DELTA MENDOTA S.A.		SAN LUIS S.A.		SAN LUIS P.P.		SAN FELIPE		EVAP STORAGE		SMP DELTA P.P.		SOUTH FAY AGUED		DOS AMIGOS DEMAND		SAN LUIS P.P.		EVAP STORAGE	
	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)	(103)	(104)	(105)							
1933-34																						
OCT	175	51	15	99	0	1	671	168	14	152	2	2	42									
NOV	64	47	15	2	0	1	672	139	11	127	1	1	42									
DEC	231	13	17	201	0	0	673	261	9	114	138	0	180									
JAN	213	14	100	99	0	1	971	343	8	99	286	1	465									
FEB	168	68	100	0	0	1	970	355	8	108	239	1	703									
MAR	169	116	50	3	0	2	971	329	9	149	171	2	872									
APR	197	124	70	3	0	3	971	114	13	170	-69	3	800									
MAY	174	156	80	-62	0	4	965	166	17	214	-85	5	730									
JUN	153	190	120	-157	0	5	743	154	20	268	-154	6	570									
JUL	53	218	150	-315	0	5	423	131	20	305	-194	6	370									
AUG	216	206	110	-100	0	4	319	133	20	295	-182	5	183									
SEP	163	102	30	31	0	1	349	76	18	196	-138	3	42									
TOTAL	1976	1315	857	-196	0	24		2399	167	2197	35	35										

1934-35

OCT	150	61	15	74	0	1	422	178	14	152	2	2	42
NOV	232	47	15	170	0	1	591	165	11	135	39	1	80
DEC	236	13	30	193	0	0	784	161	9	120	32	0	112

REVISED DELTA BALANCE
(STUDY #3)

MONTH	PEVISFO KESWICK RELEASE	REVISED HIMRUS RELEASE	SMP MOD TO FEATHER RIVER	SAC/TO AC/DP S.J.RV +TRIB	REVISED TOTAL INFLOW	REVISED CITY OF VALLEJO	REVISED CONTRA CANAL	DELTA CU	CVP EXPORT TRACY PP	SMP WHEEL FOR CVP	SMP EXPORT DELTA PP	REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
. (1106) . (1107) . (1108) . (109) . (110) . (111) . (112) . (113) . (114) . (115) . (116) . (117) . (118) . (119) . (120) .														
1930-31														
OCT	263	92	72	316	768	1	7	68	253	0	187	0	252	252
NOV	331	89	37	332	789	1	6	107	252	0	154	1	268	269
DEC	436	92	254	293	1075	1	5	160	260	0	275	36	338	374
JAN	246	92	-84	626	1080	1	5	49	259	0	393	38	326	373
FEB	144	83	-25	675	877	1	5	33	235	0	297	8	298	306
MAR	183	92	169	579	1023	1	6	37	268	7	340	44	320	364
APR	534	89	194	-8	809	1	9	83	144	0	186	0	336	336
MAY	367	92	159	189	807	1	11	104	173	0	166	0	352	352
JUN	379	150	146	70	736	1	12	178	179	10	134	5	217	222
JUL	554	164	131	-132	739	0	14	246	78	0	131	0	270	270
AUG	419	184	133	-35	701	0	13	191	126	0	133	0	228	228
SEP	334	48	56	82	524	1	11	101	121	0	76	0	214	214
TOTAL	4212	1287	1242	3187	9528	10	164	1357	2468	17	2472	132	3419	3560

1931-32

OCT	241	49	78	263	631	1	9	68	166	0	178	0	215	215
NOV	285	48	105	341	779	1	8	107	216	0	185	0	262	262
DEC	203	49	-24	1162	1390	1	7	160	260	0	393	0	354	569
JAN	203	49	-81	1348	1519	1	7	49	259	0	393	33	233	810
FEB	144	95	-126	1245	1358	1	6	33	235	0	355	0	174	728
MAR	141	157	-222	684	760	1	8	37	268	7	152	0	287	287
APR	295	228	-28	642	1137	1	9	83	154	0	374	0	476	476
MAY	324	186	-286	782	1006	1	11	104	162	0	184	0	416	524
JUN	426	237	34	177	874	1	12	178	177	88	91	9	318	327
JUL	619	397	166	-169	923	0	14	246	192	0	132	7	332	339
AUG	467	277	149	-9	884	0	13	191	281	22	131	23	223	246
SEP	329	69	75	124	617	1	11	101	154	0	96	0	214	214
TOTAL	3677	1771	-160	6590	11678	10	133	1357	2618	117	2664	72	3504	4997

1932-33

OCT	251	92	82	276	701	1	9	68	221	0	187	0	215	215
NOV	198	89	143	149	579	1	8	107	47	0	154	0	262	262
DEC	203	92	178	398	871	1	7	160	74	0	275	0	354	354
JAN	203	92	-36	846	1105	1	7	49	258	0	393	16	326	397
FEB	144	59	-23	649	639	1	6	33	206	0	307	13	273	286
MAR	148	77	7	621	853	1	6	37	173	0	314	0	320	320
APR	319	74	-56	421	755	1	9	83	214	0	168	0	280	280
MAY	425	77	5	332	639	1	11	104	182	46	138	0	357	357
JUN	481	93	112	87	773	1	12	178	177	91	88	9	217	226
JUL	564	277	81	-183	741	0	14	246	130	0	130	0	270	270
AUG	452	277	91	-27	793	0	13	191	266	0	84	11	228	239
SEP	335	85	29	99	548	1	11	101	165	0	56	0	214	214
TOTAL	3722	1394	613	3668	9397	10	115	1357	2113	137	2245	49	3316	3420

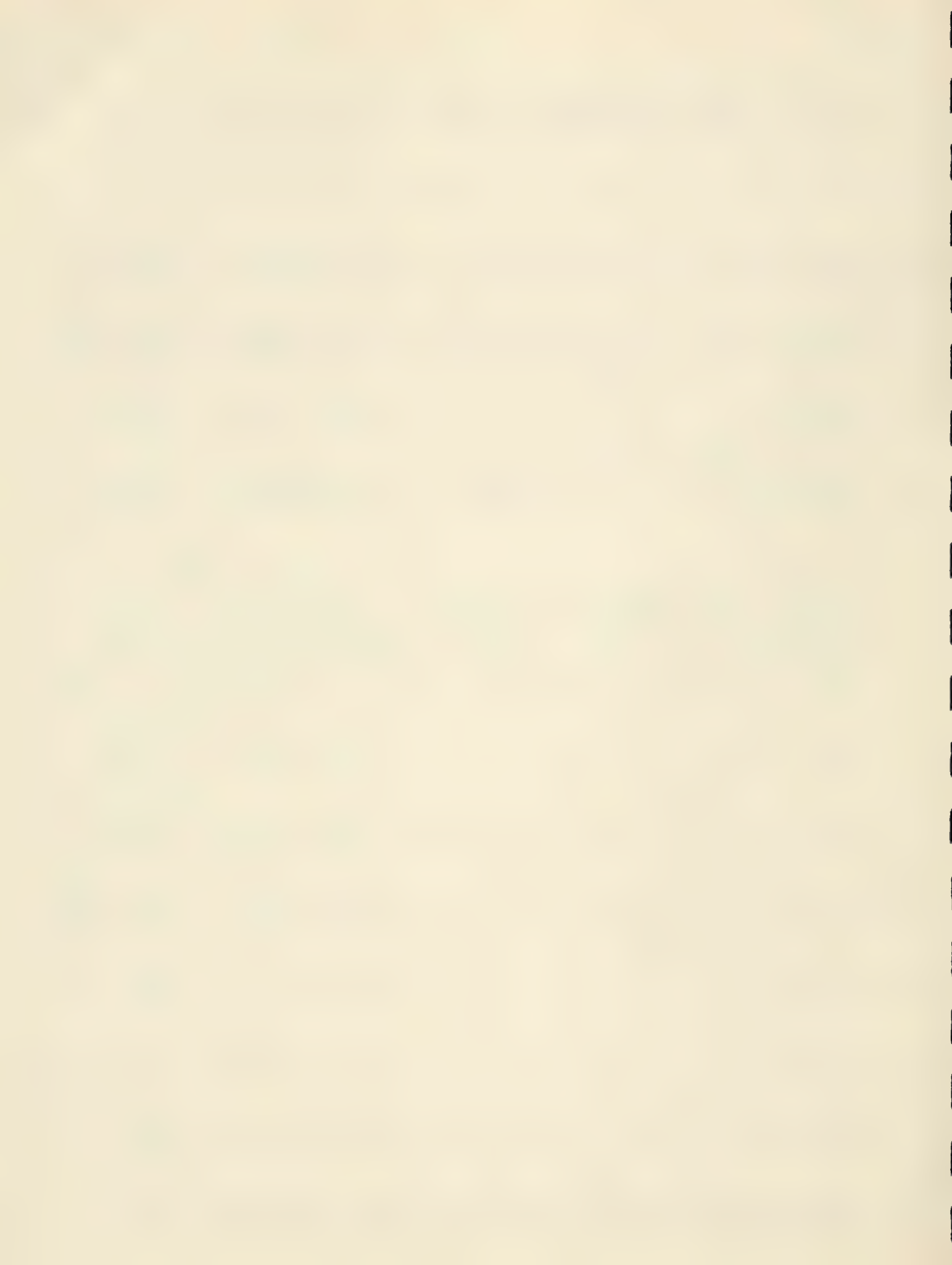
REVISED DELTA BALANCE
(STUDY #3)

MONTH	REVISED KESWICK RELEASE	REVISED NIMBUS RELEASE	SWP MOD TO FEATHER RIVER	SAC TO AC/DP S.J.RV +TRIB	REVISED TOTAL INFLOW	REVISED CITY OF VALLEJO	REVISED CONTRA COSTA CANAL	DELTA CU	CVP EXPORT TRACY PP	SWP WHEEL FOR CVP	SWP EXPORT DELTA PP	RELEASE FOR CARJAY	REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
. (106) . (107) . (108) . (109) . (110) . (111) . (112) . (113) . (114) . (115) . (116) . (117) . (118) . (119) . (120) .															
1933-34															
OCT	245	77	77	237	636	1	9	68	175	0	168	0	215	0	215
NOV	202	74	113	192	541	1	6	107	64	0	139	0	262	0	262
DEC	203	77	31	703	1614	1	7	160	231	0	261	0	354	0	354
JAN	203	94	-182	1191	1306	1	7	49	213	0	393	19	326	298	643
FEB	144	94	-195	927	973	1	6	33	168	0	355	0	198	209	407
MAR	150	91	-237	815	819	1	8	37	176	0	329	11	257	0	268
APR	324	74	-30	387	755	1	9	83	212	0	114	0	336	0	336
MAY	420	75	172	138	825	1	11	104	162	9	166	0	352	0	352
JUN	391	119	134	70	714	1	12	178	172	0	134	0	217	0	217
JUL	204	245	131	-147	714	0	14	246	73	0	131	0	270	0	270
AUG	425	240	145	-1	815	0	13	191	234	0	133	16	228	0	244
SEP	343	74	47	102	566	1	11	101	163	0	76	0	214	0	214
TOTAL	3554	1351	206	4614	9735	10	115	1357	2063	9	2399	46	3229	507	3782
. (106) . (107) . (108) . (109) . (110) . (111) . (112) . (113) . (114) . (115) . (116) . (117) . (118) . (119) . (120) .															
1934-35															
OCT	230	49	123	219	621	1	9	68	150	0	178	0	215	0	215
NOV	180	48	6	561	795	1	8	107	232	0	185	0	262	0	262
DEC	264	49	69	537	919	1	7	160	236	0	161	0	354	0	354

SAN LUIS RESERVOIR (CVP)
(STUDY #3)

SAN LUIS RESERVOIR (SWP)
(STUDY #3)

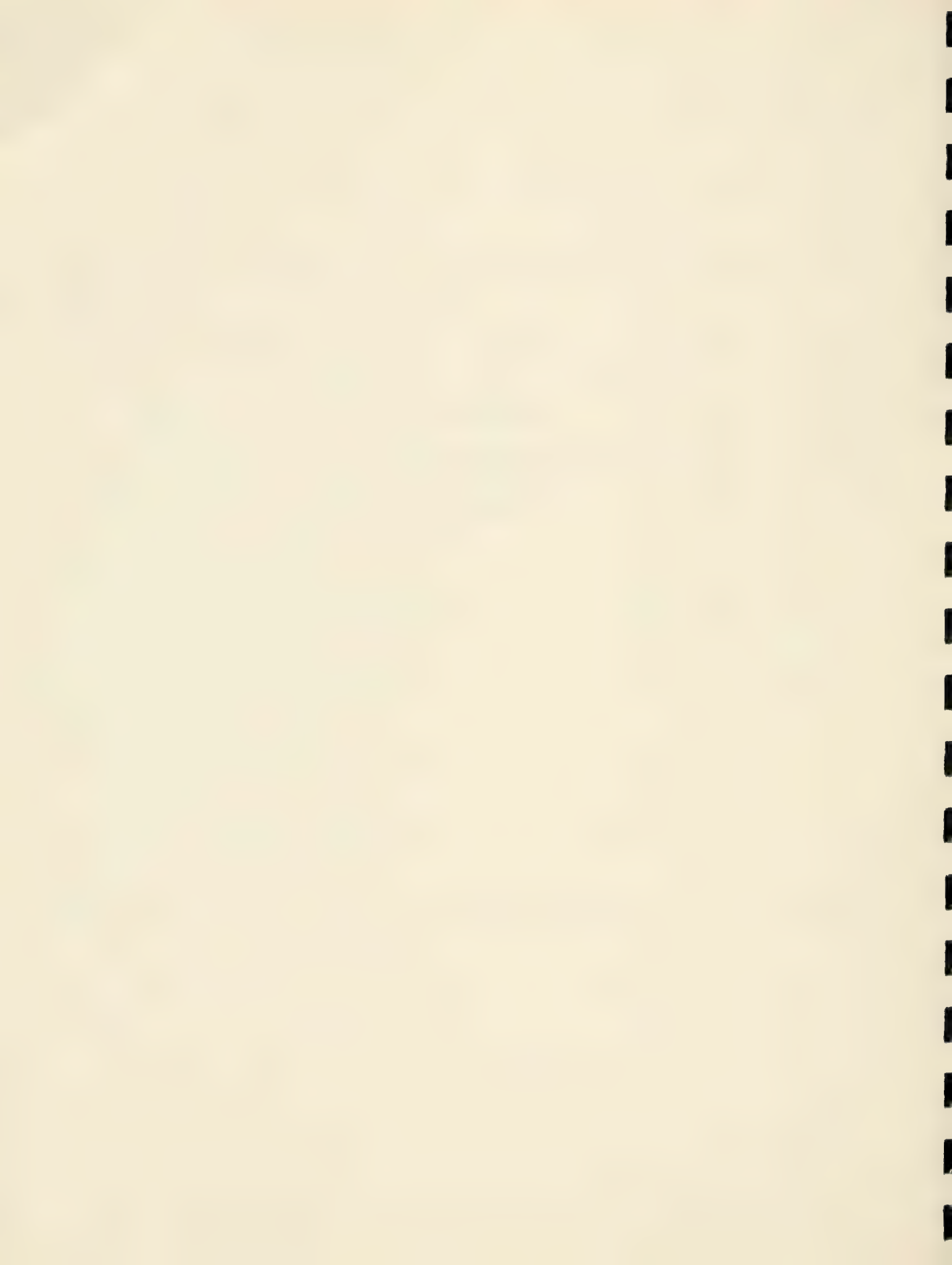
MONTH	CVP TRACY P.P.		DELTA MENDOTA S.A.		SWP DELTA WHEEL		SAN LUIS S.A.		SAN FELIPE		EVAP		EOM STORAGE		DELTA P.P.		SOUTH BAY AQUED		DOS AMIGOS DEMAND		SAN LUIS P.P.		EVAP		EOM STORAGE		
	(121)	(122)	(123)	(124)	(125)	(126)	(127)	(128)	(129)	(130)	(131)	(132)	(133)	(134)	(135)	(136)	(137)	(138)	(139)	(140)	(141)	(142)	(143)	(144)	(145)	(146)	(147)
1930-31																											
OCT	253	46	0	33	124	0	1	330	187	14	171	2	2	42													
NOV	252	42	0	40	170	0	1	499	154	11	142	1	1	42													
DEC	260	13	0	100	147	0	0	646	275	9	128	138	0	180													
JAN	259	14	0	100	145	0	1	790	393	8	108	277	1	456													
FEB	235	58	0	60	107	0	1	896	297	8	124	165	1	620													
MAR	268	116	7	82	77	0	2	571	340	9	149	182	2	800													
APR	194	124	0	70	0	0	3	968	166	13	170	3	3	800													
MAY	173	155	0	102	-85	0	4	679	166	17	214	-65	5	730													
JUN	190	218	10	139	-140	0	5	734	134	20	258	-194	6	570													
JUL	75	218	0	170	-310	0	5	419	131	20	305	-194	6	370													
AUG	136	206	0	128	-198	0	4	217	133	20	295	-182	5	183													
SEP	121	102	0	32	-13	0	1	203	76	18	196	-138	3	42													
TOTAL	2408	1345	17	1056	24	0	28	2472	2472	167	2270	35	35														
1931-32																											
OCT	160	61	0	20	79	0	1	281	178	14	162	2	2	42													
NOV	216	47	0	20	149	0	1	429	185	11	135	39	1	80													
DEC	263	13	0	30	217	0	0	646	393	9	120	264	0	344													
JAN	259	14	0	100	145	0	1	790	393	8	103	282	1	625													
FEB	235	58	0	60	107	0	1	896	355	8	116	231	1	855													
MAR	268	116	7	82	77	0	2	971	152	9	166	-23	2	830													
APR	194	124	0	70	0	0	3	968	374	13	188	173	3	1000													
MAY	182	156	0	102	-76	0	4	888	184	17	243	-76	5	925													
JUN	177	190	88	139	-64	0	5	819	91	20	313	-242	6	671													
JUL	192	218	0	170	-196	0	5	618	132	21	356	-245	6	421													
AUG	281	206	22	128	-31	0	4	583	131	20	343	-232	5	183													
SEP	194	102	0	32	60	0	1	642	96	18	216	-138	3	42													
TOTAL	2618	1315	117	953	467	0	28	2664	2664	168	2461	35	35														
1932-33																											
OCT	221	51	0	20	140	0	1	781	167	14	171	2	2	42													
NOV	47	47	0	20	-20	0	1	760	154	11	142	1	1	42													
DEC	74	13	0	30	31	0	0	791	275	9	128	138	0	180													
JAN	258	14	0	100	144	0	1	934	393	8	108	277	1	456													
FEB	206	58	0	100	38	0	1	971	307	6	124	175	1	630													
MAR	173	116	0	57	0	0	2	969	314	9	133	172	2	800													
APR	214	124	0	85	5	0	3	152	168	13	152	3	3	800													
MAY	182	156	46	97	-25	0	4	942	138	17	186	-65	5	730													
JUN	177	190	91	139	-61	0	5	876	88	20	222	-154	6	570													
JUL	130	218	0	170	-258	0	5	613	81	20	255	-194	6	370													
AUG	266	206	0	128	-68	0	4	541	84	20	246	-182	5	183													
SEP	165	102	0	30	33	0	1	573	56	18	176	-138	3	42													
TOTAL	2113	1315	137	976	-41	0	28	2245	2245	167	2043	35	35														



APPENDIX B

2020 Operation Study

USCAL-3-82



CLAIR ENGLE RESERVOIR
(STUDY #2)

WHISKEYTOWN RESERVOIR
(STUDY #2)

MODIFICATION
FOR STUDY #3

• (1) • (2) • (3) • (4) • (5) • (6) • (7) • (8) • (9) • (10) • (11) • (12) • (13) • (14) • (15) •

1927-28

MONTH	INFLOW	RELEASE	EVAP	STORAGE	ACCUR TO LEWISTN	FLOW BELOW LEWISTN	EXPORT TO CARR PH	CLEAR CREEK INFLOW	EVAP	CLEAR CREEK RELEASE	EOM STORAGE	EXPORT TO KESWICK	MOD TO EXPORT	EXPORT TO KESWICK
OCT	12	95	1	2065	0	12	63	2	0	7	241	78	0	78
NOV	73	41	-3	2100	4	15	30	13	0	8	214	62	0	62
DEC	41	47	-6	2100	2	12	37	6	0	10	187	60	0	60
JAN	76	78	0	2100	4	9	73	21	0	5	187	69	0	69
FEB	127	127	0	2100	6	9	124	28	0	3	187	149	0	149
MAR	217	0	0	2317	11	9	2	49	0	3	214	21	0	21
APR	187	56	0	2448	9	9	56	20	0	5	241	44	0	44
MAY	194	188	6	2448	10	9	189	12	1	8	241	192	0	192
JUN	48	49	8	2439	2	9	42	3	2	10	241	33	37	70
JUL	17	126	11	2319	1	9	118	2	2	10	241	108	42	150
AUG	7	110	9	2207	1	9	102	0	2	8	241	92	22	114
SEP	6	117	6	2090	1	9	109	1	1	7	241	102	11	113
TOTAL	1007	1034	32		51	120	965	157	8	84		1030	112	1142

1928-29

OCT	9	97	1	2001	0	12	65	1	1	6	241	79	5	84
NOV	22	22	-3	2004	2	15	9	3	0	9	214	30	0	30
DEC	25	42	-6	1993	1	12	31	3	0	9	187	52	0	52
JAN	28	52	0	1969	2	9	45	7	0	7	187	45	0	45
FEB	45	18	0	1996	2	9	11	9	0	5	187	15	0	15
MAR	60	31	0	2045	4	9	26	20	0	4	214	15	7	22
APR	75	43	0	2077	4	9	38	14	0	6	241	19	15	34
MAY	139	34	6	2176	7	9	32	8	1	9	241	30	17	47
JUN	57	45	8	2180	2	9	38	4	1	11	241	30	19	49
JUL	14	110	11	2073	1	9	102	1	2	9	241	92	58	150
AUG	5	110	9	1959	1	9	102	0	2	8	241	92	58	150
SEP	4	125	6	1832	0	9	116	1	2	8	241	107	0	107
TOTAL	503	729	32		26	120	635	71	9	91		606	179	785

1929-30

OCT	7	109	1	1729	1	12	58	1	1	6	241	92	0	92
NOV	7	52	-3	1687	0	15	37	1	0	7	214	58	0	58
DEC	146	5	-5	1833	7	12	0	29	0	6	187	50	0	50
JAN	39	18	0	1854	2	9	11	10	0	6	187	15	0	15
FEB	116	3	0	1967	6	9	0	25	0	4	187	21	0	21
MAR	145	9	0	2103	7	9	7	23	0	3	214	0	30	30
APR	152	17	0	2238	8	9	16	17	0	6	241	0	30	30
MAY	98	26	6	2304	5	9	22	5	1	9	241	17	21	38
JUN	41	76	8	2261	3	9	70	3	2	10	241	61	23	84
JUL	12	110	11	2652	1	9	102	1	2	10	241	92	58	150
AUG	6	111	9	2039	0	9	102	0	2	8	241	92	58	150
SEP	6	123	6	1915	0	9	114	1	0	7	241	108	11	119
TOTAL	775	659	33		40	120	579	116	8	81		606	231	837

CLAIR ENGLE RESERVOIR
(STUDY #2)

WHISKEYTOWN RESERVOIR
(STUDY #2)

MODIFICATION
FOR STUDY #3

(1) . (2) . (3) . (4) . (5) . (6) . (7) . (8) . (9) . (10) . (11) . (12) . (13) . (14) . (15) .

1930-31

MONTH	INFLOW	RELEASE	EVAP	STORAGE	ACCR TO LEWISTN	FLOW BELOW LEWISTN	EXPORT TO CARR PH	CLEAR CREEK INFLOW	EVAP	CLEAR CREEK RELEASE	EOM STORAGE	EXPORT TO KESWICK	MOD TO EXPORT	EXPORT TO KESWICK
OCT	7	109	1	1812	1	12	98	1	1	6	241	92	3	95
NOV	10	61	-3	1764	0	15	46	1	0	7	214	67	0	67
DEC	14	68	-6	1716	1	12	57	1	0	7	187	78	0	78
JAN	32	20	0	1726	2	9	13	8	0	6	187	15	0	15
FEB	40	19	0	1749	2	9	12	9	0	6	187	15	0	15
MAR	40	37	0	1792	4	9	32	20	0	4	214	21	9	30
APR	63	43	0	1832	4	9	38	14	1	5	241	19	14	33
MAY	62	42	6	1846	3	9	36	4	1	9	241	30	17	47
JUN	39	43	7	1835	2	9	36	3	1	9	240	30	19	49
JUL	9	166	10	1668	0	9	157	1	2	8	238	150	0	150
AUG	3	165	8	1498	1	9	157	1	2	7	236	150	0	150
SEP	3	123	5	1373	0	9	114	0	1	6	235	108	0	108
TOTAL	382	876	28		20	120	796	62	9	80		775	62	837

1931-32

MONTH	INFLOW	RELEASE	EVAP	STORAGE	ACCR TO LEWISTN	FLOW BELOW LEWISTN	EXPORT TO CARR PH	CLEAR CREEK INFLOW	EVAP	CLEAR CREEK RELEASE	EOM STORAGE	EXPORT TO KESWICK	MOD TO EXPORT	EXPORT TO KESWICK
OCT	8	108	1	1272	0	12	96	1	0	5	235	92	0	92
NOV	10	57	-2	1227	1	15	43	1	0	5	214	60	0	60
DEC	21	18	-5	1235	1	12	7	2	0	6	187	30	0	30
JAN	30	21	0	1244	1	9	13	7	0	5	187	15	0	15
FEB	38	20	0	1262	1	9	12	8	0	5	187	15	0	15
MAR	164	7	0	1419	8	9	6	25	0	3	200	15	0	15
APR	118	54	0	1483	6	9	51	15	0	5	225	36	0	36
MAY	197	40	5	1635	10	9	41	12	0	7	241	30	0	30
JUN	73	77	7	1624	4	9	72	5	2	9	241	66	84	150
JUL	17	167	10	1464	1	9	159	2	2	9	241	150	0	150
AUG	6	167	8	1295	1	9	159	2	2	7	241	150	0	150
SEP	4	138	5	1156	0	9	129	1	2	6	241	122	11	133
TOTAL	886	874	29		34	120	788	79	8	72		781	95	876

1932-33

MONTH	INFLOW	RELEASE	EVAP	STORAGE	ACCR TO LEWISTN	FLOW BELOW LEWISTN	EXPORT TO CARR PH	CLEAR CREEK INFLOW	EVAP	CLEAR CREEK RELEASE	EOM STORAGE	EXPORT TO KESWICK	MOD TO EXPORT	EXPORT TO KESWICK
OCT	5	126	1	1034	1	12	115	1	1	5	241	110	6	116
NOV	15	77	-2	974	1	15	63	2	0	6	214	86	9	95
DEC	16	67	-4	927	0	12	55	2	0	6	187	78	0	78
JAN	16	26	0	917	0	9	17	3	0	5	187	15	0	15
FEB	17	25	0	909	1	9	17	4	0	6	187	15	0	15
MAR	129	24	0	1014	7	9	22	22	0	2	214	15	0	15
APR	170	24	0	1164	9	9	29	19	1	5	241	15	0	15
MAY	163	29	5	1293	8	9	28	9	0	7	241	30	0	30
JUN	176	28	7	1434	9	9	28	12	2	8	241	30	0	30
JUL	33	168	10	1291	2	9	159	3	2	10	241	150	-58	92
AUG	9	168	8	1124	0	9	159	1	2	8	241	150	-58	92
SEP	6	104	5	1021	1	9	96	1	1	7	241	89	0	89
TOTAL	764	869	30		39	120	788	79	9	75		783	-101	682

CLAIR ENGLE RESERVOIR
(STUDY #2)

WHISKEYTOWN RESERVOIR
(STUDY #2)

MODIFICATION
FOR STUDY #3

MONTH	INFLW RELEASE	EVAP	EOM STORAGE	ACCR TO LEWISTN	FLOW BELOW LEWISTN	EXPCRT TO CARR PH	CLEAR CREEK INFLOW	EVAP	CLEAR CREEK RELEASE	EOM STORAGE	EXPORT TO KESWICK	MOD TO EXPORT	EXPORT TO KESWICK
	(1) . (2) . (3) . (4) . (5) . (6) . (7) . (8) . (9) . (10) . (11) . (12) . (13) . (14) . (15) .												
1933-34													
OCT	7	108	1	919	0	12	1	0	5	241	92	0	92
NOV	9	93	-2	837	1	15	1	0	5	214	102	0	102
DEC	27	22	-4	846	1	12	5	0	7	187	36	0	36
JAN	76	5	0	917	4	9	20	0	3	187	17	0	17
FEB	102	4	0	1015	5	9	21	0	3	197	18	0	18
MAR	148	20	0	1163	9	9	25	0	3	214	15	0	15
APR	140	38	0	1265	7	9	14	0	5	241	18	0	18
MAY	76	40	5	1296	4	9	4	1	8	241	30	0	30
JUN	27	46	7	1270	1	9	2	2	8	241	30	0	30
JUL	9	168	9	1102	0	9	1	2	8	241	150	-58	92
AUG	5	168	7	932	0	9	0	2	7	241	150	-58	92
SEP	4	133	5	798	0	9	1	2	7	241	116	0	116
TOTAL	650	645	28		32	120	95	9	69		774	-116	658
1934-35													
OCT	13	94	1	716	0	12	2	0	6	241	78	0	78
NOV	79	11	-2	786	4	15	15	0	6	214	36	0	36
DEC	53	9	-4	834	3	12	8	0	7	187	28	0	28

SHASTA RESERVOIR (STUDY #1)

SHASTA RESERVOIR (STUDY #2)

SHASTA RESERVOIR (STUDY #3)

MONTH	INFLOW RELEASE	EVAP STORAGE	EOM STORAGE	LOCAL DEMAND	SPR PH INFLOW	CR KESWICK TOTAL RELEASE	KESWICK MANDA-TORY RELEASE	KESWICK MANDA-TORY RELEASE	REVISED KESWICK MANDA-TORY RELEASE	MOD TO REVISED KESWICK MANDA-TORY RELEASE	SHASTA STORAGE RELEASE	MOD TO REVISED SHASTA STORAGE RELEASE	REVISED SHASTA STORAGE RELEASE
1927-29													
OCT	269	164	3	3560	78	240	240	0	3560	0	240	0	3560
NOV	456	764	0	3252	62	624	232	0	3252	0	824	0	3252
DEC	343	232	0	3363	60	292	160	0	3363	0	292	0	3363
JAN	462	71	0	3754	89	160	160	0	3754	0	160	0	3754
FEB	628	283	0	4099	149	432	150	0	4099	0	150	0	4099
MAR	949	1083	0	3965	21	1104	141	0	3965	0	141	0	3965
APR	744	154	3	4552	44	196	137	0	4552	0	196	0	4552
MAY	395	382	13	4552	192	572	331	0	4552	0	331	0	4552
JUN	256	675	16	4117	33	766	434	35	4082	741	434	-17	4099
JUL	223	730	20	3590	108	837	405	0	3595	837	405	84	3488
AUG	199	571	16	3202	92	662	385	17	3150	679	385	0	3083
SEP	190	392	11	2989	89	480	378	119	2818	612	378	0	2751
TOTAL	5054	5501	82	6505	1017	3153	3153	171	6689	612	3153	67	6868
1928-29													
OCT	198	191	4	2992	61	250	250	122	2699	0	390	-2	2634
NOV	240	204	0	3028	30	232	232	0	2735	0	232	0	2670
DEC	258	130	0	3156	30	160	160	0	2863	0	160	0	2798
JAN	268	130	0	3286	15	153	153	0	2993	0	163	0	2928
FEB	367	96	0	3557	15	111	111	0	3264	0	111	0	3199
MAR	370	126	0	3801	15	141	141	0	3508	0	141	0	3443
APR	390	374	3	3814	19	391	391	4	3517	391	391	0	3452
MAY	324	351	12	3775	30	379	317	-40	3518	339	317	0	3453
JUN	237	356	8	3648	30	384	320	-45	3436	339	320	0	3371
JUL	190	498	18	3322	92	589	255	-75	3185	514	255	-38	3158
AUG	178	394	15	3091	92	465	255	-77	3031	408	255	-40	3044
SEP	169	261	11	2988	89	349	333	151	2777	518	333	0	2790
TOTAL	3189	3119	71	3624	518	2918	2918	40	3752	3752	2918	-80	3851
1929-30													
OCT	178	97	6	3063	92	187	187	155	2697	0	342	0	2710
NOV	175	353	3	2882	30	381	278	191	2325	0	600	0	2338
DEC	700	234	0	3348	50	284	123	0	2791	0	284	0	2804
JAN	402	145	0	3605	15	160	160	0	3048	0	160	0	3061
FEB	523	123	0	4005	21	144	144	0	3448	0	144	0	3461
MAR	668	223	0	4450	0	223	141	0	3893	223	141	-30	3936
APR	417	312	3	4552	0	310	279	0	3995	310	279	-6	4044
MAY	319	307	12	4552	7	312	312	0	3995	322	312	0	4044
JUN	222	710	16	4048	30	738	399	0	3491	769	399	0	3540
JUL	190	729	19	3490	92	820	371	0	2933	820	371	-25	3007
AUG	178	567	16	3085	92	658	364	17	2511	675	364	-36	2621
SEP	178	358	3	2902	89	446	365	113	2215	578	365	0	2325
TOTAL	4150	4158	78	4663	518	3123	3123	476	5227	5227	3123	-97	5361

SHASTA RESERVOIR
(STUDY #1)SHASTA RESERVOIR
(STUDY #2)SHASTA RESERVOIR
(STUDY #3)

MONTH	INFLW RELEASE	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
1930-31															
OCT	181	151	5	2927	2	92	241	241	160	2140	341	241	0	2250	344
NOV	188	174	0	2941	2	60	232	232	117	2037	356	232	0	2147	356
DEC	178	173	0	2956	0	30	203	203	228	1824	479	203	0	1934	479
JAN	271	108	0	3119	0	15	123	123	0	1987	123	123	0	2097	123
FEB	265	114	0	3270	0	15	129	129	0	2138	129	129	0	2248	129
MAR	364	179	0	3455	0	15	164	164	0	2323	200	194	0	2433	209
APR	242	478	7	3212	2	19	495	385	89	1991	584	385	0	2101	598
MAY	197	386	8	3015	2	30	414	313	-54	1848	360	313	0	1958	377
JUN	177	401	5	2786	2	30	429	297	-80	1699	349	257	0	1809	368
JUL	163	419	15	2515	1	150	568	229	-100	1528	468	229	20	1618	488
AUG	159	323	13	2338	1	150	472	237	-24	1375	448	237	18	1447	466
SEP	154	252	9	2231	1	89	340	318	150	1118	509	318	0	1190	509
TOTAL	2549	3158	62	2561	13	695	3640	2861	426	4346	4346	2661	38	4446	4446
1931-32															
OCT	177	94	0	2314	2	92	184	184	139	1062	323	184	0	1134	323
NOV	177	151	0	2340	2	60	209	209	123	965	332	209	0	1037	332
DEC	409	93	0	2656	0	30	123	123	0	1281	123	123	0	1353	123
JAN	346	145	0	2857	0	15	160	160	0	1482	160	160	0	1554	160
FEB	313	136	0	3034	0	15	151	151	0	1659	151	151	0	1731	151
MAR	572	183	0	3423	0	15	158	198	0	2048	198	198	0	2120	198
APR	415	460	2	3376	2	15	473	473	0	2001	494	473	-21	2094	473
MAY	427	241	2	3560	2	30	269	269	0	2185	269	269	0	2278	269
JUN	237	412	14	3371	2	30	440	433	0	1996	476	433	-43	2132	517
JUL	189	366	17	3171	1	150	515	371	0	1796	515	371	-10	1942	505
AUG	166	498	15	2830	1	150	647	353	17	1438	664	353	0	1584	664
SEP	156	439	11	2536	1	89	527	381	99	1045	659	381	0	1191	670
TOTAL	3584	3218	61	3896	13	691	3896	3305	378	4364	4364	3305	-74	4385	4385
1932-33															
OCT	161	222	6	2469	2	92	312	286	151	827	481	286	-3	976	484
NOV	179	296	0	2352	2	60	354	256	184	526	564	256	-9	684	564
DEC	189	161	0	2380	0	30	191	191	152	402	391	191	0	560	391
JAN	229	108	0	2501	0	15	123	123	0	523	123	123	0	681	123
FEB	218	128	0	2591	0	15	143	143	0	613	143	143	0	771	143
MAR	786	128	0	3249	0	15	143	143	66	1205	209	143	7	1356	216
APR	479	446	7	3275	2	15	459	459	60	1171	519	459	15	1307	534
MAY	412	273	1	3413	2	30	301	301	33	1276	334	301	17	1395	351
JUN	287	344	13	3343	2	30	372	372	-20	1226	352	352	19	1326	371
JUL	188	422	17	3092	1	150	571	257	-103	1078	468	257	78	1100	488
AUG	167	242	15	2952	1	150	441	246	-131	1069	310	246	89	1002	341
SEP	157	269	9	2831	1	89	357	323	40	908	397	323	0	841	397
TOTAL	3452	3089	68	3767	13	691	3767	3100	432	4291	4291	3100	213	4403	4403

SHASTA RESERVOIR
(STUDY #1)

SHASTA RESERVOIR
(STUDY #2)

SHASTA RESERVOIR
(STUDY #3)

MONTH	INFLOW RELEASE	EVAP	EOM STORAGE	LOCAL DEMAND	SPR CR PH INFLOW	KESWICK TOTAL RELEASE	KESWICK MANDA-TORY RELEASE	MOD TO SHASTA STORAGE RELEASE	REVISED KESWICK MANDA-TORY RELEASE	REVISED KESWICK MANDA-TORY RELEASE	MOD TO SHASTA STORAGE RELEASE	REVISED KESWICK MANDA-TORY RELEASE	SHASTA STORAGE RELEASE		
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
1933-34															
OCT	172	99	2904	2	92	169	189	103	103	878	292	189	0	611	292
NOV	168	183	2886	2	60	241	241	197	197	663	480	241	0	596	480
DEC	327	33	3120	0	30	123	123	0	0	897	129	123	0	830	129
JAN	477	106	3491	0	17	123	123	0	0	1268	123	123	0	1201	123
FEB	493	93	3891	0	18	111	111	0	0	1668	111	111	0	1601	111
MAR	455	126	4220	0	15	141	141	0	0	1997	141	141	7	1923	148
APR	333	372	4178	2	18	388	388	0	0	1955	388	388	15	1866	403
MAY	255	367	4057	2	30	355	343	-66	-66	1900	329	343	40	1771	369
JUN	191	424	3811	2	30	452	266	-65	-65	1719	387	266	19	1571	406
JUL	167	448	3511	1	150	597	233	-98	-98	1517	499	233	78	1291	519
AUG	156	336	3315	1	150	485	234	-96	-96	1417	389	234	76	1115	407
SEP	150	243	3210	1	89	331	316	142	142	1170	500	316	0	868	500
TOTAL	3344	2890	75	13	699	3576	2708	117	117	3768	2708	235	3887		
1934-35															
OCT	165	96	3279	2	78	172	172	128	128	1111	300	172	0	809	300
NOV	308	335	3252	2	36	369	167	0	0	1084	369	167	0	782	369
DEC	242	124	3370	0	28	152	149	79	79	1123	231	149	0	821	231

FOLSOM RESERVOIR
(STUDY #1)FOLSOM RESERVOIR
(STUDY #2)FOLSOM RESERVOIR
(STUDY #3)

MONTH	INFLOW RELEASE (31)	EVAP (33)	EDM STORAGE (34)	LOCAL DEMAND (35)	FOLSOM SOUTH CANAL (36)	NIMBUS RELEASE (37)	MODIF TO RELEASE (38)	REVISED FOLSOM STORAGE (39)	REVISED NIMBUS RELEASE (40)	MODIF TO RELEASE (42)	REVISED FOLSOM STORAGE (43)	REVISED NIMBUS RELEASE (44)	REVISED FOLSOM STORAGE (45)
1927-28													
OCT	107	99	2	358	27	26	0	358	46	0	358	46	46
NOV	165	77	0	446	16	20	0	446	41	0	446	41	41
DEC	152	67	-2	533	12	16	0	533	39	0	533	39	39
JAN	141	54	-2	622	16	16	0	622	22	0	622	22	22
FEB	134	51	-1	706	16	20	0	706	20	0	706	20	20
MAR	869	859	0	716	25	20	0	716	814	0	716	814	814
APR	384	98	2	1000	33	38	0	1000	27	0	1000	27	27
MAY	223	207	6	1010	40	55	0	1010	112	0	1010	112	112
JUN	78	282	7	799	51	76	0	799	155	0	799	155	155
JUL	60	262	8	589	93	93	0	589	114	0	589	114	114
AUG	69	176	6	476	80	80	0	476	44	0	476	44	44
SEP	81	153	4	400	45	59	0	400	49	0	400	49	49
TOTAL	2463	2385	30	387	515	1483	0	1483	1483	0	1483	1483	1483
1928-29													
OCT	63	99	2	362	27	26	0	362	46	0	362	46	46
NOV	71	79	0	354	16	20	0	354	43	0	354	43	43
DEC	77	67	-2	366	12	16	0	366	39	0	366	39	39
JAN	67	54	-1	380	16	16	0	380	22	0	380	22	22
FEB	104	53	-1	432	15	16	0	432	22	0	432	22	22
MAR	125	69	0	488	22	20	0	488	27	0	488	27	27
APR	145	84	2	547	29	31	0	547	24	0	547	24	24
MAY	207	105	4	645	32	44	0	645	29	0	645	29	29
JUN	137	138	6	638	41	59	0	638	38	0	638	38	38
JUL	71	160	8	541	45	73	0	541	42	0	541	42	42
AUG	59	146	6	448	42	63	0	448	41	0	448	41	41
SEP	47	129	4	362	39	47	0	362	43	0	362	43	43
TOTAL	1173	1183	28	336	431	410	0	410	410	0	410	410	410
1929-30													
OCT	44	86	2	318	26	22	0	318	38	0	318	38	38
NOV	41	75	0	284	15	17	0	284	43	0	284	43	43
DEC	169	62	-2	393	11	14	0	393	37	0	393	37	37
JAN	156	49	-2	502	15	14	0	502	20	0	502	20	20
FEB	126	48	-1	583	14	20	0	583	20	0	583	20	20
MAR	224	61	0	792	21	17	0	792	23	0	792	23	23
APR	157	98	2	916	33	38	0	916	27	0	916	27	27
MAY	112	130	6	873	40	55	0	873	35	0	873	35	35
JUN	69	169	7	703	51	76	0	703	42	0	703	42	42
JUL	65	176	7	585	52	80	0	585	44	0	585	44	44
AUG	66	153	5	493	45	59	0	493	49	0	493	49	49
TOTAL	1501	1337	33	378	499	460	0	460	460	0	460	460	460

FOLSOM RESERVOIR
(STUDY #1)

FOLSOM RESERVOIR
(STUDY #2)

FOLSOM RESERVOIR
(STUDY #3)

MONTH	INFLOW	RELEASE	EVAP	EOM STORAGE	LOCAL DEMAND	FOLSOM SOUTH CANAL	NIMBUS RELEASE	MODIF TO RELEASE	REVISED STORAGE	REVISED NIMBUS RELEASE	MODIF TO RELEASE	REVISED STORAGE	REVISED NIMBUS RELEASE		
	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)	(43)	(44)	(45)
1930-31															
OCT	55	99	3	446	27	26	46	0	446	46	0	446	0	446	46
NOV	72	79	0	439	16	20	43	0	439	43	0	439	0	439	43
DEC	57	69	-3	430	12	16	41	0	430	41	0	430	0	430	41
JAN	87	54	-2	465	16	16	22	0	465	22	0	465	0	465	22
FEB	79	53	-1	492	15	16	22	0	492	22	0	492	0	492	22
MAR	110	67	0	535	22	20	25	0	535	25	0	535	0	535	25
APR	94	84	2	543	29	31	24	0	543	24	0	543	0	543	24
MAY	88	107	5	519	32	44	31	0	519	31	0	519	0	519	31
JUN	53	138	5	429	41	59	38	0	429	38	0	429	0	429	38
JUL	55	150	7	317	45	73	42	0	317	42	0	317	0	317	42
AUG	57	146	5	223	42	63	41	0	223	41	0	223	0	223	41
SEP	46	129	3	137	39	47	43	0	137	43	0	137	0	137	43
TOTAL	853	1185	24	336	336	431	418	0	418	418	0	418	0	418	418
1931-32															
OCT	51	86	1	101	26	22	38	0	101	38	0	101	0	101	38
NOV	62	75	0	88	15	17	43	0	88	43	0	88	0	88	43
DEC	184	62	-1	211	11	14	37	0	211	37	0	211	0	211	37
JAN	171	49	-1	334	15	14	20	0	334	20	0	334	0	334	20
FEB	300	42	-1	593	14	14	14	0	593	14	0	593	0	593	14
MAR	226	61	0	758	21	17	23	0	758	23	0	758	0	758	23
APR	261	97	2	920	33	38	26	12	906	38	0	861	39	861	77
MAY	403	307	6	1010	40	55	212	0	998	212	0	1010	-59	1010	153
JUN	240	255	7	986	51	76	128	0	976	128	0	976	12	976	140
JUL	107	540	9	546	55	93	392	0	534	392	0	511	119	415	511
AUG	73	197	6	416	52	80	65	0	404	65	0	263	22	263	87
SEP	88	153	3	348	45	59	49	0	336	49	0	195	0	195	49
TOTAL	2166	1924	31	378	378	499	1047	12	1059	1059	141	1200	141	1200	1200
1932-33															
OCT	80	99	2	327	27	26	46	0	315	46	0	174	0	174	46
NOV	61	79	0	309	16	20	43	0	297	43	0	156	0	156	43
DEC	72	68	-2	315	12	16	40	0	303	40	0	162	0	162	40
JAN	83	54	-1	345	16	16	22	0	333	22	0	192	0	192	22
FEB	62	53	-1	355	15	16	22	0	343	22	0	202	0	202	22
MAR	131	68	0	418	22	20	26	0	406	26	0	265	0	265	26
APR	162	84	1	495	29	24	24	0	483	24	0	342	0	342	24
MAY	228	105	4	614	32	44	29	0	602	29	0	461	0	461	29
JUN	204	169	5	644	41	59	69	0	632	69	0	491	0	491	69
JUL	76	187	7	526	45	73	69	0	514	69	0	373	0	373	69
AUG	67	191	6	396	42	63	66	0	364	66	0	256	0	256	73
SEP	53	129	3	317	39	47	45	0	305	43	0	177	0	177	43
TOTAL	1279	1286	24	336	336	431	519	0	519	519	-13	506	-13	506	506

MONTH	FOLSOM RESERVOIR (STUDY #1)				FOLSOM RESERVOIR (STUDY #2)				FOLSOM RESERVOIR (STUDY #3)					
	INFLOW RELEASE (31)	EVAP (33)	EDM STORAGE (34)	LOCAL DEMAND (35)	FOLSOM SOUTH CANAL (36)	NIMBUS RELEASE (37)	MODIF TO RELEASE (38)	REVISED STORAGE (39)	REVISED NIMBUS (40)	MODIF TO RELEASE (41)	REVISED STORAGE (42)	REVISED NIMBUS (43)	REVISED STORAGE (44)	REVISED NIMBUS (45)
1933-34														
OCT	57	2	286	26	22	38	0	274	38	0	0	0	146	38
NOV	63	0	276	15	17	41	0	264	41	0	0	0	136	41
DEC	146	-2	360	11	14	39	0	348	39	0	0	0	220	39
JAN	170	-1	482	15	14	20	0	470	20	0	0	0	342	20
FEB	146	-1	583	14	14	20	0	571	20	0	0	0	443	20
MAR	167	0	690	18	17	25	0	678	25	0	0	0	550	25
APR	121	2	725	18	31	24	0	713	24	0	0	0	585	24
MAY	61	5	629	32	44	96	0	617	96	0	0	-23	512	73
JUN	56	5	544	41	59	36	0	532	38	0	0	0	427	38
JUL	63	7	440	45	73	42	0	428	42	0	0	0	323	42
AUG	66	5	355	42	63	41	0	343	41	0	0	0	238	41
SEP	51	3	274	39	47	43	0	262	43	0	0	0	157	43
TOTAL	1191	25	327	415	467	467	0	467	467	-23	0	0	444	444
1934-35														
OCT	51	2	237	26	22	30	0	225	38	0	0	0	120	38
NOV	83	0	247	15	17	41	0	235	41	0	0	0	130	41
DEC	71	-1	255	11	14	39	0	243	39	0	0	0	138	39

FEATHER RIVER
(STUDY #1)

OROVILLE RESERVOIR
(STUDY #2)

FEATHER RIVER
(STUDY #2)

OROVILLE RESERVOIR
(STUDY #3)

MONTH	FLOW W/O SWP	INFLOW	RECY'D RELEASE	RELEASE		EVAP	EOM STORAGE	STORAGE WITHDRWL	STORED WATER	MODIF TO FLOW		MODIF TO DELTA EOM		REVISED EOM STORAGE
				TO DELTA	DELTA					FLOW	DELTA	RELEASE	RELEASE	
. (46) . (47) . (48) . (49) . (50) . (51) . (52) . (53) . (54) . (55) . (56) . (57) . (58) . (59) . (60) .														
1927-29														
OCT	139	64	149	0	2911	4	2911			87	226	0	0	2911
NOV	394	267	115	98	2966	-1	2966			-50	344	0	98	2966
DEC	374	159	109	0	3020	-4	3020			-47	327	0	0	3020
JAN	524	264	96	119	3072	-3	3072			-47	477	0	119	3072
FEB	450	350	86	229	3108	-1	3108			-35	415	0	229	3108
MAR	2527	1214	106	1418	2797	1	2797			294	2821	0	1418	2797
APR	972	589	159	0	3224	3	3224			-439	533	0	0	3224
MAY	432	344	253	0	3310	5	3310			-89	343	0	0	3310
JUN	80	155	240	22	3193	10	3193			87	157	-5	17	3198
JUL	91	128	241	0	3069	11	3069			46	137	16	16	3058
AUG	95	91	222	0	2928	10	2928			48	143	0	0	2917
SEP	69	59	143	0	2837	7	2837			64	133	0	0	2826
TOTAL	6147	3684	1919	1886		42				-81	6066	11	1897	
1928-29														
OCT	97	46	153	0	2726	4	2726			106	203	2	2	2713
NOV	161	67	115	0	2679	-1	2679			60	221	0	0	2666
DEC	238	99	109	0	2673	-4	2673			20	258	0	0	2660
JAN	310	152	101	0	2726	-2	2726			-39	271	0	0	2713
FEB	433	200	90	0	2837	-1	2837			-100	333	0	0	2824
MAR	389	231	110	0	2937	1	2937			-117	272	0	0	2944
APR	236	240	164	332	2698	3	2698			260	496	15	347	2670
MAY	210	172	241	108	2602	5	2602			99	309	1	109	2573
JUN	140	86	241	8	2525	8	2525			63	203	0	0	2496
JUL	47	74	223	14	2353	9	2353			61	108	0	8	2324
AUG	43	53	143	0	2182	8	2182			66	109	0	14	2153
SEP	34				2086	6	2086			67	101	0	0	2057
TOTAL	2338	1693	1946	462		36				546	2884	18	480	
1929-30														
OCT	77	43	122	0	2004	3	2004			75	152	0	0	1975
NOV	17	38	85	159	1799	-1	1799			209	226	0	159	1770
DEC	621	748	73	126	2351	-3	2351			-540	81	0	126	2322
JAN	859	319	65	0	2607	-2	2607			-245	614	0	0	2578
FEB	325	364	59	0	2912	0	2912			-303	22	0	0	2893
MAR	1204	495	62	240	3105	0	3105			-197	1007	0	240	3076
APR	740	476	162	0	3416	3	3416			-331	409	0	0	3387
MAY	477	334	254	86	3405	5	3405			7	484	0	86	3376
JUN	147	160	240	0	3315	10	3315			64	211	0	0	3286
JUL	53	82	241	0	3145	11	3145			62	115	0	0	3116
AUG	82	78	222	0	2992	9	2992			60	142	0	0	2963
SEP	90	64	143	0	2907	6	2907			64	154	0	0	2878
TOTAL	4692	3201	1728	611		41				-1075	3617	0	611	

FEATHER RIVER
(STUDY #1)

DROVILLE RESERVOIR
(STUDY #2)

FEATHER RIVER
(STUDY #2)

DROVILLE RESERVOIR
(STUDY #3)

MONTH	FLOW M/3 SWP	INFLW	RECID RELEASE	RELEASE TO DELTA	EVAP	EDM STORAGE	STORAGE WTHRWL	STORER WATER	MODIF TO FLOW	REVISED FLOW	MODIF TO RELEASE	REVISED EOM STORAGE
	(46)	(47)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	(58)	(60)
1930-31												
OCT	93	50	122	0	3	2832			74	167	0	2803
NOV	156	85	85	47	-1	2786			55	211	-1	46
DEC	143	75	79	304	-4	2482			316	459	0	304
JAN	319	182	70	0	-2	2596			-105	214	0	0
FEB	332	169	63	128	0	2574			29	361	0	128
MAR	390	244	66	295	2	2457			118	508	1	295
APR	400	188	129	279	2	2235			239	329	1	280
MAY	141	164	208	43	4	2144			89	230	0	43
JUN	72	117	198	0	6	2057			52	124	0	0
JUL	54	71	200	8	7	1913			31	85	0	8
AUG	52	71	184	25	5	1770			47	99	0	25
SEP	33	54	116	76	4	1628			115	148	0	76
TOTAL	1875	1470	1520	1205	24				1060	2935	0	1205
1931-32												
OCT	92	54	98	25	2	1557			74	166	0	25
NOV	106	66	68	69	0	1486			89	197	0	69
DEC	95	229	56	0	-2	1661			-159	-53	0	0
JAN	953	247	50	0	-1	1859			-183	750	0	0
FEB	570	223	45	0	0	2037			-163	407	0	0
MAR	428	440	49	146	0	2262			-247	181	0	146
APR	531	456	159	573	2	2004			257	788	-1	572
MAY	682	479	249	0	4	2230			-235	447	0	0
JUN	279	245	239	124	7	2105			118	397	-40	84
JUL	38	83	241	0	8	1939			77	115	17	17
AUG	58	82	222	0	6	1793			47	105	0	0
SEP	35	64	143	0	4	1710			58	93	0	0
TOTAL	3850	2668	1619	937	30				-267	3583	-24	913
1932-33												
OCT	58	50	123	0	2	1635			74	132	26	26
NOV	23	59	86	80	0	1528			113	136	73	153
DEC	127	72	80	194	-2	1328			213	340	0	194
JAN	286	158	70	0	-1	1417			-81	205	0	0
FEB	373	130	64	0	0	1483			-58	315	0	0
MAR	115	247	65	324	0	1341			142	257	0	324
APR	292	281	99	276	1	1246			130	422	0	276
MAY	319	313	164	77	3	1315			-8	311	0	77
JUN	188	226	164	42	5	1330			36	224	0	42
JUL	40	100	162	4	5	1259			26	66	0	4
AUG	43	79	154	7	4	1173			25	68	0	7
SEP	28	57	100	2	3	1125			39	67	0	2
TOTAL	1892	1772	1331	1006	20				651	2543	99	1105

FEATHER RIVER
(STUDY #1)

OROVILLE RESERVOIR
(STUDY #2)

FEATHER RIVER
(STUDY #2)

OROVILLE RESERVOIR
(STUDY #3)

MONTH	FLOW W/O SWP	INFLOW	REQ'D RELEASE	RELEASE TO DELTA	EVAP	LOM STORAGE	STORAGE WITHDRAWL	STORAGED WATER	MODIF TO FLOW	REVISED FLOW	MODIF TO RELEASE	REVISED DELTA RELEASE	REVISED EOM STORAGE
• (46) • (47) • (48) • (49) • (50) • (51) • (52) • (53) • (54) • (55) • (56) • (57) • (58) • (59) • (60) •													
1933-34													
OCT	90	56	93	0	1	1067			46	136	0	0	983
NOV	70	54	68	168	0	905			196	266	1	169	600
DEC	99	166	59	90	-1	923			-8	91	0	90	618
JAN	673	268	49	0	-1	1143			-206	467	0	0	1038
FEB	270	280	43	0	0	1380			-226	44	0	0	1275
MAR	510	307	50	0	0	1637			-255	255	0	0	1532
APR	291	229	128	259	2	1477			177	468	-1	258	1373
MAY	131	166	208	44	3	1388			89	220	0	44	1284
JUN	63	122	198	0	5	1307			47	110	0	0	1203
JUL	56	78	199	15	5	1166			36	92	0	15	1062
AUG	54	78	184	23	2	1035			47	101	0	23	931
SEP	59	60	116	75	2	902			116	155	0	75	798
TOTAL	2346	1864	1395	674	18				59	2405	0	674	
1934-35													
OCT	81	49	98	8	1	843			62	143	0	8	739
NOV	148	103	67	0	0	880			-19	129	0	0	776
DEC	186	116	59	8	-1	930			-32	154	0	8	826

DELTA BALANCE
(STUDY #1)

MONTH	KESWICK NIMBUS FEATHER		SAC TO JOAQUIN		SAN		OTHER		TOTAL		CITY	CONTRA	DELTA	REQ'D	EXCESS	
	RELEASE	RELEASE RIVER	AC/DP	RV AT HOOD	RV AT VERMILIS	TRIB INFLOW	DELTA INFLOW	VALLEJO	DELTA MENDOTA CANAL	DELTA CU					DELTA OUTFLOW	DELTA OUTFLOW
	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)	
1927-28																
OCT	240	46	139	142	567	247	177	991	2	17	100	68	252	552	804	
NOV	824	41	394	347	1606	155	143	1904	2	14	44	137	268	1469	1737	
DEC	292	39	374	453	1156	160	118	1436	1	12	15	160	240	1008	1248	
JAN	163	22	524	477	1183	145	93	1421	1	12	15	49	160	1184	1344	
FEB	432	20	450	951	1653	146	140	2139	1	11	73	33	561	1460	2021	
MAR	1104	814	2527	1280	5725	58	514	6297	2	14	23	37	223	5898	6121	
APR	190	27	972	463	1658	61	211	1530	2	15	179	83	321	1330	1651	
MAY	572	112	432	-131	985	57	51	1093	2	18	209	104	394	366	760	
JUN	706	155	80	-271	670	84	41	795	1	20	262	178	334	0	334	
JUL	837	114	91	-229	813	102	36	951	0	22	283	246	400	0	400	
AUG	662	44	95	-198	603	89	28	720	0	21	274	191	234	0	234	
SEP	480	49	69	-144	454	56	21	531	2	19	145	101	264	0	264	
TOTAL	6505	1483	6147	3160	17275	1360	1573	20208	16	195	1722	1357	3651	13267	16918	
1928-29																
OCT	250	46	97	36	429	68	1	498	2	17	100	68	252	59	311	
NOV	232	43	161	125	561	167	138	866	2	14	44	137	245	454	699	
DEC	160	39	238	253	690	134	149	973	1	12	15	160	213	572	785	
JAN	153	22	310	127	612	153	68	833	1	12	15	49	197	559	756	
FEB	111	22	433	186	952	118	81	1151	1	11	73	33	177	856	1033	
MAR	141	27	389	152	709	48	53	850	2	14	123	37	159	674	874	
APR	391	24	236	-137	514	43	78	635	2	11	129	33	286	124	410	
MAY	379	29	210	-94	524	50	44	618	2	13	163	104	336	0	336	
JUN	364	38	140	-101	461	64	83	608	1	15	197	178	217	0	217	
JUL	589	42	47	-44	634	80	36	750	0	17	217	246	270	0	270	
AUG	485	41	43	-22	547	71	29	647	0	16	212	191	228	0	228	
SEP	349	43	34	-66	360	57	21	438	2	14	107	101	214	0	214	
TOTAL	3624	416	2338	615	6993	1053	821	9867	16	166	1395	1357	2794	3139	5933	
1929-30																
OCT	167	38	77	36	338	112	7	457	2	13	64	68	215	95	310	
NOV	381	43	17	-77	364	39	0	403	2	10	49	137	235	0	235	
DEC	284	37	621	516	1458	58	123	1639	1	9	15	160	354	1100	1454	
JAN	160	20	859	455	1494	113	290	1897	1	9	15	49	151	1672	1823	
FEB	144	20	325	584	1073	91	148	1312	1	8	73	33	114	1083	1197	
MAR	223	23	1204	781	2231	53	237	2521	2	11	123	37	249	2099	2348	
APR	310	27	740	-16	1061	56	105	1222	2	15	179	93	359	584	943	
MAY	312	35	477	-117	707	61	46	814	2	18	209	104	318	163	481	
JUN	738	42	147	-247	680	71	41	792	1	20	262	178	331	0	331	
JUL	820	42	53	-204	751	56	36	683	0	22	246	246	332	0	332	
AUG	658	44	82	-185	599	62	28	709	0	21	274	191	223	0	223	
SEP	446	49	90	-136	449	57	25	531	2	19	145	101	264	0	264	
TOTAL	4663	460	4692	1390	11205	889	1066	13180	16	175	1691	1357	3145	6796	9941	

DELTA BALANCE
(STUDY #1)

SAN

MONTH	RESWICK RELEASE	NIMBUS RIVER	FEATHER RIVER	SACI TO BASIN AC/DP	SACI TO RV AT HOOD	JUAQUIN RV AT VERNLIS	OTHER TRIP INFLOW	TOTAL DELTA INFLOW	CITY OF VALLEJC	CONTRA COSTA CANAL	DELTA MENDOTA CANAL	DELTA CU	REQ'D DELTA OUTFLOW	EXCESS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)
1930-31															
OCT	241	46	93	57	437	106	34	577	2	17	100	58	252	138	390
NOV	232	43	156	16	447	117	44	608	2	14	44	107	206	235	441
DEC	203	41	143	21	608	60	0	468	1	12	15	160	271	9	280
JAN	123	22	319	281	745	122	190	1057	1	12	15	49	326	654	980
FEB	129	22	332	130	613	111	84	808	1	11	73	33	153	537	690
MAR	194	25	390	47	656	51	58	765	2	14	123	37	192	397	589
APR	495	24	90	-178	431	43	51	525	2	11	129	81	300	0	300
MAY	414	31	141	-70	516	51	60	627	2	13	163	104	345	0	345
JUN	429	38	72	-43	496	67	45	608	1	15	197	178	217	0	217
JUL	568	42	54	-25	639	76	35	750	0	17	217	246	270	0	270
AUG	472	41	52	-15	550	68	29	647	0	16	212	191	228	0	228
SEP	340	43	33	-55	361	56	21	438	2	14	107	101	214	0	214
TOTAL	3840	418	1875	166	6299	928	651	7878	16	166	1395	1357	2974	1970	4944
1931-32															
OCT	184	38	92	73	387	86	15	488	2	13	64	68	215	126	341
NOV	209	43	108	34	394	119	82	595	2	10	49	107	218	209	427
DEC	123	37	96	622	878	177	473	1528	1	9	15	160	291	1052	1343
JAN	160	20	933	240	1353	159	126	1638	1	9	15	49	156	1408	1564
FEB	151	14	570	161	896	201	390	1487	1	8	73	33	122	1250	1372
MAR	198	23	428	107	756	41	78	875	2	11	123	37	241	461	702
APR	473	26	531	-255	775	58	92	925	2	15	179	83	467	179	646
MAY	269	212	682	-24	1139	53	120	1312	2	18	209	104	363	616	979
JUN	440	128	279	-267	580	75	52	707	1	20	262	178	246	0	246
JUL	518	392	38	-208	737	106	40	883	0	22	283	245	332	0	332
AUG	647	65	58	-176	594	86	29	709	0	21	274	191	223	0	223
SEP	527	49	35	-152	459	51	21	531	2	19	145	101	264	0	264
TOTAL	3896	1047	3650	155	8948	1212	1518	11678	16	175	1691	1357	3138	5301	8439
1932-33															
OCT	312	46	58	-5	411	28	0	439	2	17	100	68	252	0	252
NOV	354	43	23	-43	377	58	0	435	2	14	44	107	268	0	268
DEC	191	40	127	81	439	97	65	621	1	12	15	160	338	95	433
JAN	123	22	286	323	754	183	282	1199	1	12	15	49	273	849	1122
FEB	143	22	373	81	619	116	29	774	1	11	73	33	143	513	656
MAR	143	26	115	184	468	50	127	645	2	14	123	37	197	272	469
APR	459	24	292	-222	553	50	60	663	2	11	129	83	329	109	438
MAY	301	29	319	-14	635	57	53	785	2	13	163	104	325	178	503
JUN	372	69	188	-162	467	64	57	588	1	15	197	178	197	0	197
JUL	571	69	40	-46	634	80	36	750	0	17	217	246	270	0	270
AUG	441	86	43	-23	547	71	29	647	0	16	212	191	228	0	228
SEP	357	43	28	-60	368	50	20	438	2	14	107	101	214	0	214
TOTAL	3767	519	1892	94	6272	904	608	7984	16	166	1395	1357	3034	2016	5050

DELTA BALANCE
(STUDY #1)

MONTH	KESWICK RELEASE	NIMBUS RELEASE	FEATHER RIVER	SAC TO BASIN AC/DP	SAC TO RV AT HOOD	SAN		CITY OF VALLEJO	CONTRA COSTA CANAL	DELTA MENDOTA CANAL	DELTA CU	REQ'D DELTA OUTFLOW	EXCESS DELTA OUTFLOW	TOTAL DELTA OUTFLOW	
						JOAQUIN RV AT VERNLIS	OTHER TRIB INFLOW								
	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)
OCT	169	38	90	98	415	95	50	560	2	13	64	68	215	198	413
NOV	241	41	70	-49	303	60	0	363	2	10	49	107	188	7	195
DEC	123	39	99	424	685	95	241	1021	1	9	15	160	354	482	836
JAN	123	20	673	273	1089	119	122	1330	1	9	15	49	191	1065	1256
FEB	111	20	270	379	780	157	242	1179	1	8	73	33	135	929	1064
MAR	141	29	910	189	665	46	19	930	2	11	123	37	157	600	757
APR	388	24	291	-203	500	41	62	603	2	11	129	83	275	103	378
MAY	395	96	131	-94	528	61	38	627	2	13	163	134	345	0	345
JUN	452	38	63	-59	494	66	48	608	1	15	197	178	217	0	217
JUL	597	42	56	-33	662	53	35	750	0	17	217	246	270	0	270
AUG	485	41	54	-9	571	47	29	647	0	16	212	191	228	0	228
SEP	331	43	39	-48	365	47	26	438	2	14	107	131	214	0	214
TOTAL	3576	467	2346	868	7257	807	912	9056	16	146	1364	1357	2789	3384	6173
	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)	(71)	(72)	(73)	(74)	(75)
OCT	172	38	81	101	392	122	17	531	2	13	84	68	215	149	364
NOV	369	41	148	173	731	139	133	1003	2	10	44	107	207	633	840
DEC	152	39	186	184	561	135	142	838	1	9	15	160	213	440	653

1-33-34

1-34-35

REVISED DELTA BALANCE
(STUDY #2)

MONTH	REVISED NIMBUS FEATHER RIVER		REVISED SAC'ID RIVER AT HOOD		SAN JOAQUIN OTHER TRIBS		REVISED TOTAL DELTA INFLOW		CITY OF VALLEJO	CONTRA COSTA CANAL		DELTA CU	CVP EXPORT TRACY PP	SWP EXPORT DELTA PP	REQUIRE DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
	(76)	(77)	(78)	(79)	(80)	(81)	(82)	(83)		(84)	(85)						
1927-28																	
OCT	240	46	226	654	424	1078	2	17	68	269	387	0	252	83	335		
NOV	824	41	344	1556	298	1854	2	14	107	254	381	0	268	828	1096		
DEC	292	39	327	1111	278	1389	1	12	160	262	387	0	240	327	567		
JAN	160	22	477	1136	238	1374	1	12	49	260	271	3	233	545	781		
FEB	432	20	415	1818	286	2104	1	11	53	240	102	0	561	1156	1717		
MAR	1104	814	2821	6019	572	6591	2	14	37	275	136	0	230	5897	6127		
APR	196	27	533	1219	272	1491	2	15	63	274	157	0	321	639	960		
MAY	572	112	343	846	108	1004	2	18	104	267	199	0	394	0	394		
JUN	741	155	167	741	125	917	1	20	178	281	26	0	411	0	411		
JUL	837	114	137	859	138	997	0	22	246	283	46	0	400	0	400		
AUG	679	44	143	668	117	785	0	21	191	291	48	0	234	0	234		
SEP	612	49	133	650	77	727	2	19	101	277	64	0	264	0	264		
TOTAL	6689	1483	6066	17378	2933	20311	16	195	1357	3253	2204	3	3808	9475	13286		
1928-29																	
OCT	390	46	203	675	69	744	2	17	68	269	136	0	252	0	252		
NOV	232	43	221	621	305	926	2	14	107	254	281	0	268	0	268		
DEC	162	39	258	732	283	1015	1	12	160	262	242	0	338	0	338		
JAN	183	22	271	603	221	824	1	12	49	260	176	0	326	0	326		
FEB	111	22	333	852	199	1051	1	11	33	240	355	31	268	80	411		
MAR	141	27	272	592	141	733	2	14	37	273	139	0	347	0	347		
APR	395	24	496	778	321	899	2	11	63	215	241	0	347	0	347		
MAY	339	29	309	583	94	677	2	13	104	113	94	0	351	0	351		
JUN	339	38	203	479	147	626	1	15	178	152	63	0	217	0	217		
JUL	514	42	108	620	116	736	0	17	246	142	61	0	270	0	270		
AUG	408	41	109	536	100	636	0	16	191	135	66	0	228	0	228		
SEP	518	43	101	596	78	674	2	14	101	276	67	0	214	0	214		
TOTAL	3752	416	2884	7667	1874	9541	16	166	1357	2591	1921	31	3379	80	3490		
1929-30																	
OCT	342	38	152	568	119	687	2	13	68	266	123	0	215	0	215		
NOV	600	43	226	792	39	831	2	10	107	254	173	23	262	0	285		
DEC	284	37	81	918	181	1099	1	9	160	262	271	42	354	0	396		
JAN	160	20	614	1249	403	1652	1	9	49	260	387	0	326	620	946		
FEB	144	20	22	770	239	1009	1	8	33	240	355	27	156	189	372		
MAR	223	23	1007	2034	290	2324	2	11	37	275	387	29	365	1198	1612		
APR	310	27	409	730	161	891	2	15	63	274	134	0	383	0	383		
MAY	322	35	484	724	104	831	2	18	104	287	22	0	398	0	398		
JUN	769	42	211	775	112	887	1	20	178	281	52	0	355	0	355		
JUL	820	82	115	813	132	945	0	22	246	283	62	0	332	0	332		
AUG	675	44	142	676	110	786	0	21	191	291	60	0	223	0	223		
SEP	578	49	154	645	82	727	2	19	101	277	64	0	264	0	264		
TOTAL	5227	460	3617	10694	1975	12669	16	175	1357	3250	2090	121	3653	2007	5781		

REVISED DELTA BALANCE
(STUDY #2)

MONTH	REVISED DELTA BALANCE (STUDY #2)			CITY OF VALLEJO	CONTRA CANAL	DELTA CU	CVP EXPORT TRACY PP		SWP EXPORT DELTA PP		REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW		
	REVIS KESWICK RELEASE	REVISED NIMBUS RELEASE	REVISED FEATHER RIVER				REVISED SAC TO RV AT HOOD	SAN JOAQUIN + OTHER TRIBS	REVISED TOTAL DELTA INFLOW	EXP RT TRACY PP				EXP RT DELTA PP	RELEA SE FOR CARWAT
1930-31															
OCT	341	46	167	611	140	751	2	17	66	269	143	0	252	0	252
NOV	356	43	211	626	161	787	2	14	107	254	142	0	268	0	268
DEC	479	41	459	1000	60	1060	1	12	160	262	246	41	338	0	379
JAN	123	22	214	640	312	952	1	12	49	260	302	2	326	0	328
FEB	129	22	361	642	195	837	1	11	33	240	250	2	300	0	302
MAR	203	25	508	780	109	889	2	14	37	275	223	18	275	0	320
APR	584	24	329	759	94	853	2	11	83	226	243	0	288	0	288
MAY	360	31	230	551	111	662	2	13	104	103	84	0	356	0	356
JUN	349	38	124	468	112	580	1	15	178	117	52	0	217	0	217
JUL	468	42	85	570	111	681	0	17	246	117	31	0	270	0	270
AUG	448	41	99	573	97	670	0	16	191	188	47	0	228	0	228
SEP	509	43	148	645	77	722	2	14	161	276	110	5	214	0	219
TOTAL	4346	418	2935	7865	1579	9444	16	166	1357	2587	1873	68	3377	0	3445
1931-32															
OCT	323	38	166	600	101	701	2	13	68	266	137	0	215	0	215
NOV	332	43	197	606	201	807	2	10	107	254	172	0	262	0	262
DEC	123	37	-63	719	650	1369	1	9	160	262	387	0	354	196	550
JAN	160	20	750	1170	285	1455	1	9	49	260	387	13	237	499	749
FEB	151	14	407	733	591	1324	1	8	33	240	355	0	179	508	687
MAR	198	23	181	509	119	628	2	11	37	275	11	0	292	0	292
APR	494	38	788	1065	150	1215	2	15	83	274	275	22	544	0	566
MAY	269	212	447	904	173	1077	2	18	104	287	253	15	398	0	413
JUN	476	128	397	734	127	861	1	20	178	281	26	0	355	0	355
JUL	515	392	115	814	146	960	0	22	246	283	77	0	332	0	332
AUG	664	65	105	658	115	773	0	21	191	291	47	0	223	0	223
SEP	659	49	93	649	72	721	2	19	101	277	58	0	264	0	264
TOTAL	4364	1059	3583	9161	2730	11891	16	175	1357	3250	2185	50	3655	1203	4908
1932-33															
OCT	481	46	132	654	28	682	2	17	68	269	74	0	252	0	252
NOV	564	43	136	700	58	758	2	14	107	254	113	0	268	0	268
DEC	391	40	340	852	182	1034	1	12	160	262	246	15	338	0	353
JAN	123	22	205	673	445	1118	1	12	49	260	387	0	326	83	409
FEB	143	22	315	561	155	716	1	11	33	240	171	0	260	0	260
MAR	209	26	257	676	177	853	2	14	37	275	205	0	320	0	320
APR	519	24	422	743	110	853	2	11	83	248	229	0	280	0	280
MAY	334	29	311	660	150	810	2	13	104	271	63	0	357	0	357
JUN	352	69	224	483	121	604	1	15	178	167	26	0	217	0	217
JUL	468	69	66	557	116	673	0	17	246	114	26	0	270	0	270
AUG	310	86	68	441	100	541	0	16	191	81	25	0	228	0	228
SEP	397	43	67	447	70	517	2	14	101	147	39	0	214	0	214
TOTAL	4291	519	2543	7447	1712	9159	16	166	1357	2588	1604	15	3330	83	3428

SAN LUIS RESERVOIR (CVP)
(STUDY #2)

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SAM LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SAP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE	
	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)	(103)	(104)
1927-28														
OCT	269	100	32	137	17	1	296	367	14	126	245	2	343	
NOV	254	44	34	176	10	1	461	381	11	107	263	1	605	
DEC	262	15	67	180	7	0	634	387	9	97	281	0	886	
JAN	260	15	74	171	7	1	797	271	8	81	182	1	1067	
FEB	240	73	36	131	8	1	919	162	8	93	1	1	1067	
MAR	275	123	88	64	10	2	971	136	9	125	2	2	1067	
APR	274	179	89	6	13	3	961	157	13	141	3	3	1067	
MAY	287	209	114	-36	19	4	902	199	17	183	-1	5	1061	
JUN	281	262	166	-167	26	5	764	26	20	235	-229	6	826	
JUL	283	283	206	-206	29	5	464	46	20	267	-241	6	579	
AUG	291	274	173	-156	26	4	278	48	20	258	-230	5	344	
SEP	277	145	36	96	24	1	349	64	18	162	-116	3	225	
TOTAL	3253	1722	1135	396	196	28		2204	167	1877	160	35		

SAN LUIS RESERVOIR (SWP)
(STUDY #2)

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SAM LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SAP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE	
	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)	(103)	(104)
1928-29														
OCT	269	100	32	137	17	1	468	136	14	126	-6	2	217	
NOV	254	44	75	135	10	1	592	281	11	107	163	1	379	
DEC	262	15	208	39	7	0	624	242	9	97	136	0	515	
JAN	260	15	74	171	7	1	787	176	8	81	87	1	601	
FEB	240	73	36	131	8	1	909	355	8	93	254	1	854	
MAR	273	123	76	74	10	2	971	139	9	125	5	2	857	
APR	215	129	77	9	9	3	968	241	13	141	87	3	941	
MAY	113	163	98	-148	14	4	802	94	17	183	-106	5	830	
JUN	152	197	160	-205	20	5	572	63	20	235	-192	6	632	
JUL	142	217	178	-253	23	5	291	61	20	267	-226	6	400	
AUG	135	212	150	-227	20	4	40	66	20	258	-212	5	183	
SEP	276	107	30	139	19	1	159	67	18	162	-113	3	67	
TOTAL	2591	1395	1194	2	164	28		1921	167	1877	-123	35		

SAN LUIS RESERVOIR (CVP)
(STUDY #2)

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SAM LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SAP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE	
	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)	(103)	(104)
1929-30														
OCT	266	64	31	171	14	1	315	123	14	126	-19	2	46	
NOV	254	49	34	171	6	1	479	173	11	107	55	1	100	
DEC	262	15	45	202	4	0	677	271	9	97	165	0	265	
JAN	260	15	103	142	5	1	813	387	8	81	298	1	562	
FEB	240	73	125	42	6	1	848	355	8	93	254	1	815	
MAR	275	123	148	4	7	2	843	387	9	125	253	2	1066	
APR	274	179	59	36	13	3	863	134	13	141	-20	3	1043	
MAY	287	209	114	-36	19	4	804	22	17	183	-178	5	860	
JUN	281	262	186	-167	26	5	666	52	20	235	-233	6	651	
JUL	283	283	206	-206	29	5	366	62	20	267	-225	6	420	
AUG	291	274	173	-156	26	4	180	60	20	258	-218	5	197	
SEP	277	145	36	96	24	1	251	64	18	162	-116	3	78	
TOTAL	3250	1691	1260	299	179	28		2090	167	1877	46	35		

SAN LUIS RESERVOIR (CVP)
(STUDY #2)

SAN LUIS RESERVOIR (SWP)
(STUDY #2)

MONT-1	SAN LUIS RESERVOIR (CVP) (STUDY #2)				SAN LUIS RESERVOIR (SWP) (STUDY #2)				EOM STORAGE	EVAP	EOM STORAGE		
	CVP TRACY P.P.	DELTA S.A.	SAN LUIS S.A.	SAN FELIPE P.P.	SAN LUIS P.P.	SAN FELIPE P.P.	SMP DELTA P.P.	SOUTH BAY AQUED				DOS AMIGOS DEMAND	SAN LUIS P.P.
. (91) . (92) . (93) . (94) . (95) . (96) . (97) . (98) . (99) . (100) . (101) . (102) . (103) . (104) . (105) .													
1930-31													
OCT	269	100	32	137	17	1	370	143	14	128	1	2	77
NOV	254	44	45	165	10	1	524	142	11	107	24	1	100
DEC	262	15	88	159	7	0	676	246	9	97	140	0	240
JAN	260	15	113	132	7	1	800	302	8	81	213	1	452
FEB	240	73	122	45	8	1	836	250	8	93	149	1	600
MAR	275	123	120	32	10	2	856	223	9	127	122	2	700
APR	226	129	51	46	9	3	690	243	13	127	133	3	800
MAY	103	163	83	-143	14	4	729	84	17	162	-95	5	700
JUN	117	197	135	-215	20	5	469	52	20	202	-170	6	524
JUL	117	217	149	-249	23	5	212	31	20	229	-218	6	300
AUG	188	212	124	-148	20	4	40	47	20	222	-195	5	100
SEP	276	107	21	148	19	1	168	110	18	147	-55	3	42
TOTAL	2587	1395	1083	109	164	28		1873	167	1707	-1	35	

1931-32

OCT	266	64	21	181	14	1	334	137	14	121	2	2	42
NOV	254	49	24	181	6	1	508	172	11	102	59	1	100
DEC	262	15	26	221	4	0	725	387	9	90	288	0	388
JAN	260	15	103	142	5	1	861	387	8	78	301	1	688
FEB	240	73	125	42	6	1	896	355	8	87	260	1	947
MAR	275	123	148	4	7	2	891	11	9	125	-123	2	822
APR	274	179	59	36	13	3	911	275	13	141	121	3	940
MAY	287	209	146	-68	19	4	820	253	17	183	53	5	988
JUN	281	262	186	-167	26	5	622	26	20	235	-229	6	753
JUL	283	283	206	-206	29	5	382	77	20	267	-210	6	537
AUG	291	274	173	-156	26	4	196	47	20	238	-231	5	301
SEP	277	145	36	96	24	1	267	58	18	162	-122	3	176
TOTAL	3250	1691	1253	306	179	28		2185	167	1849	169	35	

1932-33

OCT	269	100	32	137	17	1	386	74	14	128	-68	2	106
NOV	254	44	34	176	10	1	551	113	11	107	-5	1	100
DEC	262	15	67	180	7	0	724	246	9	97	140	0	240
JAN	260	15	101	144	7	1	860	387	8	81	298	1	537
FEB	240	73	123	44	8	1	895	171	8	93	70	1	606
MAR	275	123	120	32	10	2	915	205	9	100	96	2	700
APR	248	129	51	68	9	3	971	229	13	113	103	3	800
MAY	271	163	94	14	14	4	967	63	17	141	-95	5	700
JUN	167	197	135	-165	20	5	777	26	20	168	-162	6	532
JUL	114	217	149	-252	23	5	457	26	20	191	-185	6	341
AUG	81	212	124	-255	20	4	218	25	20	185	-180	5	156
SEP	147	107	21	19	19	1	217	39	18	132	-111	3	42
TOTAL	2588	1395	1051	142	164	28		1604	167	1536	-99	35	

SAN LUIS RESERVOIR (CVP)
(STUDY #2)

(91) . (92) . (93) . (94) . (95) . (96) . (97) . (98) . (99) . (100) . (101) . (102) . (103) . (104) . (105) .

SAN LUIS RESERVOIR (SWP)
(STUDY #2)

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SAN LUIS S.A.	SAN LUIS F.P.P.	SAN FELIPE	EVAP	EOP STORAGE	SWP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE
1933-34													
OCT	266	64	21	181	14	1	383	145	14	113	18	2	58
NOV	254	49	24	181	6	1	557	151	11	97	43	1	100
DEC	262	15	26	221	4	0	774	233	9	84	140	0	240
JAN	260	15	100	145	5	1	913	387	8	75	304	1	543
FEB	240	73	122	45	6	1	951	355	8	81	266	1	808
MAR	272	123	120	29	7	2	971	51	9	112	-70	2	736
APR	189	129	51	9	9	3	968	267	13	127	67	3	800
MAY	91	163	94	-166	14	4	784	84	17	162	-95	5	700
JUN	132	197	135	-200	20	5	559	47	20	202	-175	6	519
JUL	119	217	149	-247	23	5	284	36	20	229	-213	6	300
AUG	116	212	124	-220	20	4	40	47	20	222	-195	5	100
SEP	276	197	21	148	19	1	168	110	18	147	-55	3	42
TOTAL	2477	1364	987	126	147	28		1853	167	1651	35	35	
1934-35													
OCT	286	84	21	181	14	1	334	137	14	121	2	2	42
NOV	249	44	24	181	6	1	508	337	11	102	224	1	265
DEC	262	15	26	221	4	0	725	99	9	90	0	0	265

REVISED DELTA BALANCE
(STUDY #3)

REVISED DELTA BALANCE
(STUDY #3)

MONTH	REVISED KESWICK RELEASE	REVISED NIMBUS RELEASE	REVISED FEATHER RIVER AT MOOD	REVISED SAC TO RIVER	REVISED TOTAL DELTA INFLOW	CITY OF VALLEJO	CONTRA COSTA CANAL	DELTA CU	CVP EXPORT TRACY PP	SWP WHEEL FOR CVP	SWP EXPORT DELTA PP	EXPORT RELEASE FOR CARWAT	REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
	(106)	(107)	(108)	(109)	(110)	(111)	(112)	(113)	(114)	(115)	(116)	(117)	(118)	(119)	(120)
1927-28															
OCT	240	46	226	654	1078	2	17	68	269	0	387	0	252	83	335
NOV	824	41	344	1556	1854	2	14	107	254	0	381	0	268	828	1096
DEC	292	39	327	1111	1389	1	12	160	262	0	387	0	240	327	567
JAN	160	22	477	1136	1374	1	12	49	260	3	271	4	233	541	778
FEB	432	20	415	1818	2104	1	11	33	240	1	102	0	561	1155	1716
MAR	1104	814	2821	6019	6591	2	14	37	275	7	136	0	230	5890	6120
APR	196	27	533	1219	1491	2	15	83	274	15	157	0	321	624	945
MAY	572	112	343	896	1004	2	18	104	184	0	184	0	394	118	512
JUN	761	155	162	807	932	1	20	178	179	154	25	1	374	0	375
JUL	963	114	153	1001	1139	0	22	246	283	120	46	22	400	0	422
AUG	701	44	143	690	807	0	21	191	291	22	48	0	234	0	234
SEP	623	49	133	661	738	2	19	101	277	11	64	0	264	0	264
TOTAL	6868	1483	6077	17568	20501	16	195	1357	3048	333	2188	27	3771	9566	13364
1928-29															
OCT	393	46	205	680	749	2	17	68	269	3	136	2	252	0	254
NOV	232	43	221	621	926	1	14	107	254	0	281	0	268	0	268
DEC	182	39	258	732	1015	1	12	160	262	0	242	0	338	0	338
JAN	183	22	271	603	824	1	12	49	260	0	176	0	326	0	326
FEB	111	22	333	852	1051	1	11	33	240	0	355	31	300	80	411
MAR	148	27	272	599	740	1	14	37	240	5	139	0	268	0	268
APR	410	24	511	808	929	2	11	83	230	0	256	0	347	0	347
MAY	356	29	310	601	695	2	13	104	130	0	95	0	351	0	351
JUN	358	38	203	498	645	1	15	178	171	0	63	0	217	0	217
JUL	534	42	168	640	756	0	17	246	162	0	61	0	270	0	270
AUG	426	41	109	554	654	0	16	191	153	0	66	0	228	0	228
SEP	518	43	101	596	674	2	14	101	276	0	67	0	214	0	214
TOTAL	3851	416	2902	7784	9658	16	166	1357	2682	8	1937	33	3379	80	3492
1929-30															
OCT	342	38	152	568	687	2	13	68	266	0	123	0	215	0	215
NOV	600	43	226	792	831	2	10	107	254	0	173	0	262	0	265
DEC	284	37	81	918	1099	1	9	160	262	0	271	42	354	0	396
JAN	160	20	614	1249	1652	1	9	49	260	0	387	0	326	620	946
FEB	144	20	22	770	1009	1	8	33	240	0	355	27	156	189	372
MAR	223	23	1007	2034	2324	2	11	37	275	0	387	29	385	1198	1612
APR	334	27	409	754	915	2	15	83	274	23	135	0	383	0	383
MAY	343	35	484	745	852	2	18	104	184	124	22	0	398	0	398
JUN	792	42	211	798	910	1	20	178	179	122	52	3	355	0	358
JUL	853	82	115	846	978	0	22	246	283	28	62	5	332	0	337
AUG	697	44	142	698	808	0	21	191	291	22	60	0	223	0	223
SEP	589	49	154	656	738	2	19	101	277	11	64	0	264	0	264
TOTAL	5361	460	3617	10828	12803	16	175	1357	3045	330	2091	129	3653	2007	5789

REVISED DELTA BALANCE
(STUDY #3)

MONTH	(107) • (108) • (109) • (110) • (111) • (112) • (113) • (114) • (115) • (116) • (117) • (118) • (119) • (120) •		REVISED SAC TO RIVER AT HOOD	REVISED FEATHER RIVER	REVISED NIMBUS RIVER	REVISED KESWICK RELEASE	CITY OF VALLEJO	CONTRA COSTA CANAL	DELTA CU	CVP EXPORT TRACY PP	SMP WHEEL FOR CVP	SMP EXPORT DELTA PP	EXPORT RELEASE FOR CARWAT	REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW
	REVIS TO	DELTA INFLOW														
1930-31																
OCT	344	46	167	754	2	17	68	269	3	143	0	252	0	252	0	252
NOV	356	43	210	786	2	14	107	254	0	141	0	268	0	268	0	268
DEC	479	41	459	1060	1	12	160	338	0	246	41	326	0	326	0	326
JAN	123	22	214	952	1	12	49	260	0	302	2	300	0	300	0	300
FEB	129	22	361	837	1	11	33	240	7	250	2	320	0	320	0	320
MAR	209	25	508	898	2	14	37	275	0	223	20	288	0	288	0	288
APR	598	24	330	868	2	11	63	241	0	243	0	356	0	356	0	356
MAY	377	31	230	679	2	13	104	120	0	84	0	217	0	217	0	217
JUN	368	38	124	599	1	15	178	136	0	52	0	270	0	270	0	270
JUL	488	42	85	701	0	17	246	137	0	31	0	228	0	228	0	228
AUG	466	41	99	688	0	16	191	206	0	47	0	214	0	214	0	214
SEP	509	43	148	722	2	14	101	276	0	110	5	337	0	337	0	337
TOTAL	4446	418	2935	9544	16	166	1357	2676	10	1872	70	3617	1331	3617	83	3447
1931-32																
OCT	323	38	166	701	2	13	68	266	0	137	0	219	0	219	0	219
NOV	332	43	197	807	2	10	107	254	0	172	0	262	0	262	0	262
DEC	123	37	-63	1369	1	9	160	262	0	387	0	354	196	354	196	354
JAN	160	20	750	1455	1	9	49	260	0	387	13	237	499	237	499	749
FEB	151	14	407	1324	1	8	33	240	0	355	0	179	508	179	508	687
MAR	199	31	181	636	2	11	37	275	8	11	0	292	0	292	0	292
APR	473	77	787	1232	2	15	83	274	15	275	24	544	0	544	0	544
MAY	269	153	447	1018	2	18	104	184	0	184	0	398	128	398	128	526
JUN	517	140	357	874	1	20	178	179	171	8	0	317	0	317	0	317
JUL	505	511	132	1086	0	22	246	283	103	77	23	332	0	332	0	332
AUG	664	87	105	795	0	21	191	291	22	47	0	223	0	223	0	223
SEP	670	49	93	732	2	19	101	277	11	58	0	264	0	264	0	264
TOTAL	4385	1200	3559	12029	16	175	1357	3045	330	2098	60	3617	1331	3617	83	5008
1932-33																
OCT	484	46	158	711	2	17	68	269	3	97	3	252	0	252	0	252
NOV	564	43	209	831	2	14	107	254	0	177	9	268	0	268	0	268
DEC	391	40	340	1034	1	12	160	262	0	246	15	338	0	338	0	338
JAN	123	22	205	1118	1	12	49	260	0	387	0	326	83	326	83	409
FEB	143	22	315	716	1	11	33	240	0	171	0	260	0	260	0	260
MAR	216	26	257	860	2	14	37	275	7	205	0	320	0	320	0	320
APR	534	24	422	868	2	11	83	263	0	229	0	280	0	280	0	280
MAY	371	29	311	827	2	13	104	184	104	63	0	357	0	357	0	357
JUN	488	69	224	623	1	15	178	179	7	26	0	217	0	217	0	217
JUL	341	69	66	693	0	17	246	134	0	26	0	270	0	270	0	270
AUG	397	73	68	559	0	16	191	99	0	25	0	228	0	228	0	228
SEP	397	43	67	517	2	14	101	147	0	39	0	214	0	214	0	214
TOTAL	4403	506	2642	9357	16	166	1357	2566	121	1691	27	3330	83	3330	83	3440

REVISED DELTA BALANCE
(STUDY #3)

MONTH	REVISED NIMBUS FEATHER RIVER AT HOOD		CITY OF VALLEJO	CONTRA COSTA CANAL	DELTA CU	CVP EXPORT TRACY PP	SMP WHEEL FOR CVP	SMP EXPORT DELTA PP	RELEASE FOR CARWAT	REQ'D DELTA OUTFLOW	SURPLUS DELTA OUTFLOW	TOTAL DELTA OUTFLOW			
	RELEASE	REVISION													
. (106) . (107) . (108) . (109) . (110) . (111) . (112) . (113) . (114) . (115) . (116) . (117) . (118) . (119) . (120) .															
1933-34															
OCT	292	38	136	564	709	2	13	68	266	0	145	0	215	0	215
NOV	480	41	267	739	799	2	10	107	254	0	151	12	262	0	274
DEC	129	39	91	683	1019	1	9	160	262	0	233	0	354	0	354
JAN	123	20	467	883	1124	1	9	49	260	0	387	25	326	67	418
FEB	111	20	44	554	953	1	8	33	240	0	355	0	267	49	316
MAR	148	25	255	617	682	2	11	37	275	4	51	0	302	0	302
APR	403	24	467	691	794	2	11	83	204	0	207	0	288	0	288
MAY	369	73	220	568	667	2	13	104	108	0	84	0	356	0	356
JUN	406	38	110	495	609	1	15	178	151	0	47	0	217	0	217
JUL	519	42	92	620	708	0	17	246	139	0	36	0	270	0	270
AUG	407	41	101	540	616	0	16	191	134	0	47	0	228	0	228
SEP	500	43	155	650	723	2	14	101	276	0	110	6	214	0	220
TOTAL	3887	444	2405	7604	9403	16	146	1357	2569	4	1853	43	3299	116	3458
1934-35															
OCT	300	38	143	582	721	2	13	68	266	0	137	0	215	0	215
NOV	369	41	129	712	984	2	10	107	249	0	337	17	262	0	279
DEC	231	39	154	608	885	1	9	160	262	0	99	0	354	0	354

SAN LUIS RESERVOIR (CVP)
(STUDY #3)

SAN LUIS RESERVOIR (SWP)
(STUDY #3)

MONTH	SAN LUIS RESERVOIR (CVP) (STUDY #3)				SAN LUIS RESERVOIR (SWP) (STUDY #3)				EVAP	EOM STORAGE					
	CVP TRACY P.P.	DELTA MENDOTA S.A.	SAN LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SWP DELTA P.P.			SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.		
	(121)	(122)	(123)	(124)	(125)	(126)	(127)	(128)	(129)	(130)	(131)	(132)	(133)	(134)	(135)
1927-28															
OCT	269	100	0	35	134	17	1	293		387	14	128	245	2	343
NOV	254	44	0	34	176	10	1	458		381	11	107	263	1	605
DEC	262	15	0	67	180	7	0	631		387	9	97	281	0	886
JAN	260	15	3	74	174	7	1	797		271	8	81	182	1	1067
FEB	240	73	1	37	131	8	1	919		102	8	93	1	1	1067
MAR	275	123	7	95	64	10	2	971		136	9	125	2	2	1067
APR	274	179	15	104	6	13	3	961		157	13	141	3	3	1067
MAY	184	209	0	135	-160	19	4	778		184	17	183	-16	5	1046
JUN	179	262	154	210	-139	26	5	608		25	20	235	-230	6	610
JUL	283	283	120	230	-110	29	5	464		46	20	267	-241	6	563
AUG	291	274	22	195	-156	26	4	278		48	20	258	-230	5	328
SEP	277	145	11	47	96	24	1	349		64	18	162	-116	3	209
TOTAL	3048	1722	333	1263	396	196	28			2188	167	1877	144	35	
1928-29															
OCT	269	100	3	35	137	17	1	468		136	14	128	-6	2	201
NOV	254	44	0	75	135	10	1	592		281	11	107	163	1	363
DEC	262	15	0	208	39	7	0	624		242	9	97	136	0	499
JAN	260	15	0	74	171	7	1	787		176	8	81	87	1	585
FEB	240	73	0	36	131	8	1	909		355	8	93	254	1	838
MAR	275	123	5	83	74	10	2	971		139	9	125	5	2	841
APR	230	129	0	92	9	9	3	968		256	13	141	102	3	940
MAY	130	163	0	115	-148	14	4	802		95	17	183	-105	5	830
JUN	171	197	0	179	-205	20	5	572		63	20	235	-192	6	632
JUL	162	217	0	198	-253	23	5	291		61	20	267	-226	6	400
AUG	153	212	0	168	-227	20	4	40		66	20	258	-212	5	163
SEP	276	107	0	30	139	19	1	159		67	18	162	-113	3	67
TOTAL	2682	1395	8	1293	2	164	28			1937	167	1877	-107	35	
1929-30															
OCT	266	64	0	31	171	14	1	315		123	14	128	-19	2	46
NOV	254	49	0	34	171	6	1	479		173	11	107	55	1	100
DEC	262	15	0	45	202	4	0	677		271	9	97	165	0	265
JAN	260	15	0	103	142	5	1	813		387	8	81	298	1	562
FEB	240	73	0	126	41	6	1	847		355	8	93	254	1	815
MAR	275	123	0	155	-3	7	2	835		387	9	125	253	2	1066
APR	274	179	23	74	44	13	3	863		135	13	141	-19	3	1044
MAY	184	209	124	135	-36	19	4	804		22	17	183	-178	5	861
JUN	179	262	122	210	-171	26	5	602		52	20	235	-203	6	692
JUL	283	283	28	230	-202	29	5	366		62	20	267	-225	6	421
AUG	291	274	22	195	-156	26	4	180		60	20	258	-218	5	198
SEP	277	145	11	47	96	24	1	251		64	18	162	-116	3	79
TOTAL	3045	1691	330	1385	299	179	28			2091	167	1877	47	35	

SAN LUIS RESERVOIR (CVP)
(STUDY #3)

(121) • (122) • (123) • (124) • (125) • (126) • (127) • (128) • (129) • (130) • (131) • (132) • (133) • (134) • (135) •

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SWP DELTA WHEEL	SAN LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SWP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE
1930-31														
OCT	269	100	3	35	137	17	1	370	143	14	128	1	2	78
NOV	254	44	0	45	165	10	1	524	141	11	107	23	1	100
DEC	262	15	0	88	159	7	0	676	246	9	97	140	0	240
JAN	260	15	0	113	132	7	1	800	302	8	81	213	1	452
FEB	240	73	0	122	45	8	1	836	290	8	93	149	1	600
MAR	275	123	7	127	32	10	2	856	223	9	112	102	2	700
APR	241	129	0	66	46	9	3	890	243	13	127	103	3	800
MAY	120	163	0	100	-143	14	4	729	84	17	162	-95	5	700
JUN	136	197	0	154	-215	20	5	489	52	20	202	-170	6	524
JUL	137	217	0	169	-249	23	5	212	31	20	229	-218	6	300
AUG	206	212	0	142	-148	20	4	40	47	20	222	-195	5	100
SEP	276	107	0	21	148	19	1	168	110	18	147	-55	3	42
TOTAL	2676	1395	10	1182	109	164	28		1672	167	1707	-2	35	

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SWP DELTA WHEEL	SAN LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SWP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE
1931-32														
OCT	266	64	0	21	181	14	1	334	137	14	121	2	2	42
NOV	254	49	0	24	181	6	1	508	172	11	102	59	1	100
DEC	262	15	0	26	221	4	0	725	387	9	90	288	0	388
JAN	260	15	0	103	142	5	1	861	367	8	78	301	1	688
FEB	240	73	0	126	41	6	1	895	355	8	87	260	1	947
MAR	275	123	8	155	5	7	2	891	11	9	125	-123	2	822
APR	274	179	15	74	36	13	3	911	275	13	141	121	3	940
MAY	184	209	0	167	-192	19	4	696	184	17	183	-16	5	919
JUN	179	262	171	210	-122	26	5	543	8	20	235	-247	6	666
JUL	283	283	103	230	-127	29	5	382	77	20	267	-210	6	450
AUG	291	274	22	195	-156	26	4	196	47	20	258	-231	5	214
SEP	277	145	11	47	96	24	1	267	58	18	162	-122	3	89
TOTAL	3045	1691	330	1378	306	179	28		2098	167	1849	82	35	

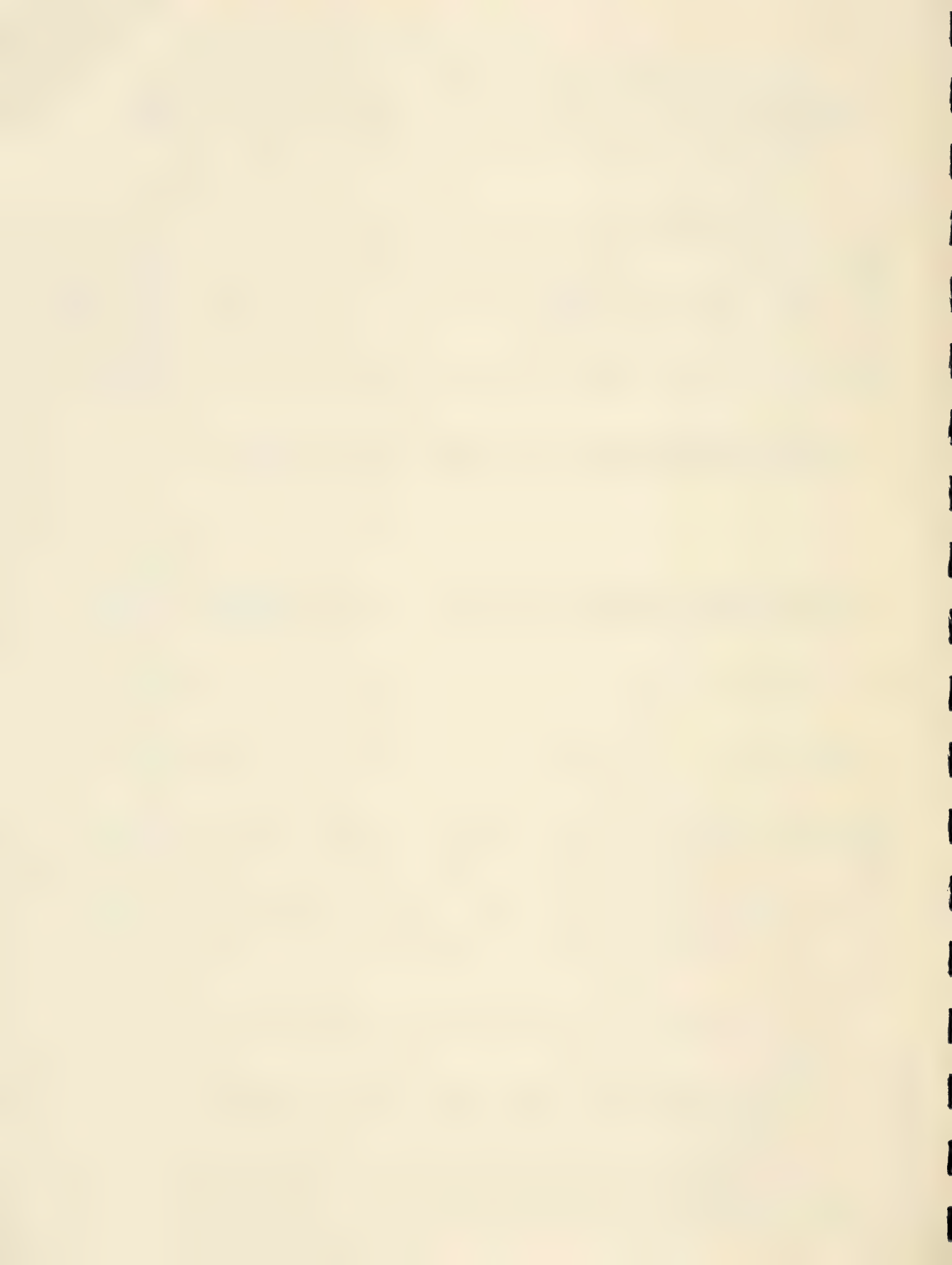
MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SWP DELTA WHEEL	SAN LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SWP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE
1932-33														
OCT	269	100	3	35	137	17	1	386	97	14	128	-45	2	42
NOV	254	44	0	34	176	10	1	591	177	11	107	59	1	100
DEC	262	15	0	67	180	7	0	724	246	9	97	140	0	240
JAN	260	15	0	101	144	7	1	860	387	8	81	298	1	537
FEB	240	73	0	123	44	8	1	895	171	8	93	171	1	606
MAR	275	123	7	127	32	10	2	915	205	9	100	96	2	700
APR	263	129	0	66	68	9	3	971	229	13	113	103	3	800
MAY	184	163	104	111	14	14	4	967	63	17	141	-95	5	700
JUN	179	197	7	154	-165	20	5	777	26	20	168	-162	6	532
JUL	134	217	0	169	-252	23	5	497	26	20	191	-185	6	341
AUG	99	212	0	142	-255	20	4	218	25	20	185	-180	5	156
SEP	147	107	0	21	19	19	1	217	39	18	132	-111	3	42
TOTAL	2566	1395	121	1150	142	164	28		1691	167	1536	-12	35	

SAN LUIS RESERVOIR (CVP)
(STUDY #3)

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SMP DELTA WHEEL	SAN LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SMP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE
1933-34														
OCT	266	64	0	21	181	14	1	383	145	14	113	18	2	58
NOV	254	49	0	24	181	6	1	557	151	11	97	43	1	100
DEC	262	15	0	26	221	4	0	774	233	9	84	140	0	240
JAN	260	15	0	100	145	5	1	913	387	8	75	304	1	543
FEB	240	73	0	122	45	6	1	951	355	8	81	266	1	808
MAR	275	123	4	127	29	7	2	971	51	9	112	-70	2	736
APR	204	129	0	66	9	9	3	968	207	13	127	67	3	800
MAY	168	163	0	111	-166	14	4	784	84	17	152	-95	5	700
JUN	151	197	0	154	-203	20	5	559	47	20	202	-175	6	519
JUL	139	217	0	169	-247	23	5	284	36	20	229	-213	6	300
AUG	134	212	0	142	-220	20	4	40	47	20	222	-195	5	100
SEP	276	107	0	21	148	19	1	168	110	18	147	-55	3	42
TOTAL	2569	1364	4	1083	126	147	28		1893	167	1651	35	35	

SAN LUIS RESERVOIR (SMP)
(STUDY #3)

MONTH	CVP TRACY P.P.	DELTA MENDOTA S.A.	SMP DELTA WHEEL	SAN LUIS S.A.	SAN LUIS P.P.	SAN FELIPE	EVAP	EOM STORAGE	SMP DELTA P.P.	SOUTH BAY AQUED	DOS AMIGOS DEMAND	SAN LUIS P.P.	EVAP	EOM STORAGE
1934-35														
OCT	286	84	0	21	181	14	1	334	137	14	121	2	2	42
NOV	249	44	0	24	181	6	1	508	337	11	102	224	1	265
DEC	262	15	0	26	221	4	0	725	99	9	90	0	0	265



Appendix H

ENVIRONMENTAL COMMITMENTS



APPENDIX H

ENVIRONMENTAL COMMITMENTS

Section 11 of the Coordinated Operation Agreement creates a major commitment to environmental protection by requiring both parties to the agreement to operate their respective projects in conformity with the Delta standards in Exhibit A, which are extracted from Decision 1485 of the State Water Resources Control Board.

Mitigation Measures

Diminution of the CVP's potential capability to control water temperatures for salmon spawning in the rivers below its major reservoirs during critical years could be a potential adverse environmental effect, but this would be mitigated by the overall protective standards for salmon in Exhibit A. These standards are designed to mitigate for impacts to the salmon (and other) resources, and meeting these standards is judged more beneficial to this resource than not meeting these standards.

Temperature control for fish protection in the Sacramento and Trinity rivers is a recognized concern in the operation of the CVP and is the subject of ongoing studies. The concern exists with or without the Proposed Action, and the Proposed Action would not necessarily make it any worse. Further studies and actions will provide added mitigation.

Effects of changing annual drawdowns to cultural resources

Increased drawdowns may adversely affect cultural resources located in the drawdown zone by erosion and exposure to vandels. By Reservoir the expected impacts are:

- Shasta - By the year 2020 there will be an expected 4% increase of drawdowns of over 100 feet with the Agreement (Table 14). This will have a slight increase in erosion of cultural resource and their exposure to potential vandalism. If such a scenario does occur, the U. S. Forest Service and the Bureau will account for this potential in future cultural resource planning with concurrence with the State Historic Preservation Officer.
- Clair Engle - No changes in drawdown frequency are anticipated.
- Whiskeytown - Less fluctuation in reservoir levels will occur. This should have a beneficial effect on those cultural resources in the drawdown zone.

Appendix I

CULTURAL RESOURCES

APPENDIX I

CULTURAL RESOURCES

MAR 23 1984

MP-0150

William S. Briner
State Historic Preservation Officer
P. O. Box 2390
Sacramento, California 95811

Dear Mr. Briner:

The State of California, Department of Water Resources, and the Bureau of Reclamation are preparing a joint Environmental Impact Statement/Environmental Impact Report for the coordinated operation of the Central Valley Project (CVP) and the State Water Project (SWP). The SWP and CVP simultaneously use the same channels of the Sacramento River and the Sacramento-San Joaquin Delta to convey water, and they draw upon a common water supply in the Delta. The purpose of the proposed agreement is to assure that each project obtains its share of the water and bears its share of obligations to protect other beneficial uses of water in the Delta and Sacramento Valley.

Three alternatives, including a no-action alternative, have been examined. Under the proposed action, the CVP and the SWP would continue to operate as they have in recent years, although using a new sharing formula. The new sharing formula would not result in physically observable changes, although CVP reservoirs would be drawn down further in drought years.

We do not feel that the proposed action will have an adverse effect on sites eligible for or on the National Register of Historic Places and request your concurrence in a "Determination of No Effect."

Any possible effects to cultural resources during greater than present draw-downs can be addressed on an "as-needed basis."

Sincerely,

cc: MP-780

JWest:mkf 3-22-84

DEPARTMENT OF PARKS AND RECREATION

P.O. BOX 2390
SACRAMENTO 95811

(916) 445-2358

MAY 9 - 1984

Mr. J. R. Graham
 Assistant Regional Director
 Mid-Pacific Regional Office
 Bureau of Reclamation
 2800 Cottage Way
 Sacramento, CA 95825

Dear Mr. Graham:

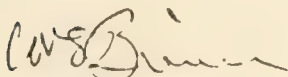
EIS/EIR for Coordinated Operation of the
 Central Valley Project and the State Water Project

This is in response to your letter of March 23, 1984, notifying me of the Bureau's intent to prepare an Environmental Impact Statement for Coordinated Operation of the State Water Project and the Central Valley Project. Your letter also requested my concurrence in the Bureau's determination that the proposed action would not affect properties included in or eligible for inclusion in the National Register of Historic Places.

I concur in your determination but also suggest that the Environmental Impact Statement include a plan that specifies how the Bureau will deal with possible effects to cultural resources during greater than present drawdown situations.

If I can be of further assistance in this matter, please do not hesitate to call me.

Sincerely,



Wm. S. Briner
 State Historic Preservation Officer
 Office of Historic Preservation

L-2143H

BUREAU OF RECLAMATION OFFICIAL COPY RECEIVED		
MAY 10 1984		
CODE	ACTION	DATE
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Appendix J

CALIFORNIA DEPARTMENT OF WATER RESOURCES -
RESPONSE TO QUESTIONS RELATED TO THE
COORDINATED OPERATION AGREEMENT

APPENDIX J

CALIFORNIA DEPARTMENT OF WATER RESOURCES -
RESPONSE TO QUESTIONS RELATED TO THE
COORDINATED OPERATION AGREEMENT

Water Quality

1. Does the agreement as presently drafted provide sufficient assurances that Delta water quality will be protected, at least to the D-1485 level, during a drought year?

Answer

Yes -- both the Central Valley Project (CVP) and State Water Project (SWP) will be operated to meet the Delta water quality standards in Exhibit A. These standards are extracted from State Water Resources Control Board Decision 1485. Article 11 (a) specifies that the two projects will be operated to those standards. This level of protection will continue unless the agreement is amended. Amendment is called for when the State Water Resources Control Board adopts new standards and the Secretary of Interior determines they are not inconsistent with congressional directives.

The operation studies leading up to the agreement are based upon the 1928-34 drought. All inbasin needs and Delta water quality requirements are met in those studies. However, during a drought both projects will of necessity curtail deliveries to their contractors in accordance with contract provisions. The 1928-34 drought is customarily used for planning purposes as it is more severe, because of its long-term nature, than the 76-77 drought.

2. How much water will be required to ensure that D-1485 standards will be met?

Answer

The current estimate based upon 57 years of records, of the average water supply required to protect the Delta to D-1485 standards is approximately 5.8 million acre feet per year. A critical dry period such as occurred between 1928 and 1934 would have required an average of 4,986,000 acre feet per year (Exhibit B-1). Of this amount, 1,357,000 acre feet is consumed within the Delta and the remainder is outflow to San Francisco Bay.

3. Does the 75%-25% sharing formula mean that the CVP is responsible for supplying 75% of flows needed to meet Sacramento Valley inbasin uses (including Delta water quality standards) during a drought? If so, why does the CVP have three times as much responsibility to supply water needed to meet Delta water quality standards?

Answer

The 75%-25% sharing formula applies to storage withdrawals when the Delta is under "controlled" or "balanced" water conditions. That is releases from project reservoirs and/or variations in export pumping are necessary to meet Delta water quality standards. These controlled conditions would prevail much of the time during a drought but, of course, not all of the time. The CVP is responsible for supplying 75% of the necessary flows. This was agreed to because the CVP has a much greater storage capacity and contractual demand within the Valley than does the SWP. CVP service area demands in the Sacramento Valley currently exceed three million acre feet per year, a major portion of the inbasin use. The SWP Sacramento Valley demands are approximately one million acre feet per years. The 75%-25% split and the 55%-45% split on the right to export unstored water during balanced water conditions were agreed to as being equitable.

Water Supply

4. As a result of this agreement, are there any explicit or implicit understandings or commitments to construct additional storage facilities, such as: Auburn Dam, the Peripheral Canal, Cottonwood, High Shasta, or Los Banos Grande?

Answer

There are no explicit or implicit understandings or commitments to construct any additional storage facilities. The parties do understand that should any additional storage facilities be constructed, the party that undertakes such construction will obtain the net benefits from the facility. Any adjustments to the COA sharing formula or Table B-1 will then be made in accordance with Articles 6 and 14 of the agreement.

5. Exhibit B(2) presents the annual water supplies for the two projects in the year 2020. This shows an increase of 900,000 AF of storage in the American River, and an increase of 400,000 AF in the Sacramento River. How were these increases computed? Were any assumptions regarding additional water storage made?

Answer

Exhibits B-1 and B-2 portray annual water supplies that may be delivered by both projects in each year during the 1928-1934 critical period. While it reflects water that has been stored, it is composed of both released stored water and water that is directly diverted for use. The increase of 900,000 AF in the American River basin and 400,000 AF in the Sacramento River Basin represent increases in service area demands and basin water use rather than increases in storage. The 900,000 AF increased use is assumed to be brought about through deliveries from the American River and Folsom South Canal or a variation of it to Southern Sacramento County and the East Bay Municipal Utility District. In addition to the

900,000 AF, as note 6 on Exhibit B-2 indicates, 120,000 acre feet would be delivered above Folsom to satisfy Placer County Water Agency rights. The increase of 400,000 acre feet in the Sacramento River Basin is based upon additional CVP contractor use primarily from the Tehama-Colusa Canal. The increases were computed by varying the operations of Folsom Reservoir to meet the increased demands and by varying the operation of Shasta and the Trinity River facilities to meet increasing demands. No additional water storage facilities of the two projects were assumed. However, it was assumed that within the areas of origin there would be additional storage and use by others.

6. What is the current yield of the SWP?

Answer

Exhibit B-1 (1980 level) shows that the SWP would have an available supply of 3.7 MAF/yr; 1.0 MAF/yr for the lower Feather River service area and 2.7 MAF/yr for export from the Delta. Of the Delta export supply, approximately 0.2 MAF/yr would be lost through seepage and evaporation.

7. Please describe the importance of determining the annual water supplies for each project.

Answer

It is important to calculate the estimated annual supplies for planning, contracting, and operating each project. The 1980 level supplies are the basis for establishing the sharing formulas of the COA. The available water supplies can be contrasted with projected water demands to enable the timely development of projects to meet demands. Also, long-term contracts for the sale of water depend upon the amount available. The operation of the projects from one year to the next must take into account the storage requirements and contract curtailments necessary to meet the annual supplies that have previously been represented.

It is important to realize, however, that the operation studies used for supply calculations contain numerous assumptions and estimates and are based upon the historical hydrologic record. While history may repeat itself, it is unlikely it will repeat itself exactly. Also, it is certainly conceivable that we may have a drought that is worse than 1928 through 1934. Also, because of the assumptions made concerning future development and uses within the basins tributary to the Delta and the operational demands of the two projects, Table B-1 (1980) should certainly be considered more accurate than B-2 (2020). However, both of these Tables are our best efforts at calculating the annual supplies of the projects.

Re-authorization

8. The 1937 CVP authorization declares that its facilities "shall be used first for river regulation, navigation and flood control; second for irrigation and domestic uses; and third for power." If water quality is to be a project purpose, where should it be placed in this list of priorities?

Answer

With the COA in place there will be no need to reauthorize the CVP for water quality purposes. As we have stated in answer to question 1, the CVP (and SWP) will be operated to meet the Delta water quality standards.

9. What is the life of this agreement?

Answer

The COA has no fixed term or expiration date and is designed to remain in effect for as long as both the CVP and SWP operate. Provisions allow for termination [Article 14 (b)(1) and (2)] if (1) a contract for the purchase and conveyance of water [Article 10(h)(1)] is not agreed to by December 31, 1988, or (2) amendments to water right permits are not received [Article 10(h)(4)] or (3) after periodic review the parties fail to reach agreement on revisions. Termination could only happen after an impasse in negotiations could not be resolved. Special provisions are included to avoid such termination. Article 14(b)(1) and (2) specifies the designation of a three person Advisory Board to consider, for one and two years, respectively, the problem causing the impasse. The parties must amend the COA and follow any unanimous recommendations of the Advisory Board and may only terminate if they fail to make such recommendations. It is highly unlikely that the agreement would be terminated as both parties recognize the necessity of coordinated operation to the projects and overall public interest.

The COA will require amendments to adjust to changing circumstances but the method of incorporating new facilities and adjusting the operating formulas will be followed for the foreseeable future.

10. What is the relationship between this agreement and the water rights granted by the State for each project? Will new water rights have to be granted?

Answer

The COA was negotiated on the basis that the existing water rights of each project are adequate and no new water rights are necessary. However, the SWP and CVP need to add the other project's Delta pumping plant as an additional point of diversion to respective water right permits to reflect existing operational conditions. For many years the projects have pumped water for each other during facility outage conditions and other circumstances. The State Water Resources Control Board has indicated that it will postpone acting on this matter until the 1986 Delta standards hearings. To the extent that CVP water is sold to the SWP on an interim basis as contemplated in Article 10(h), additional water right permit modifications may be necessary. This matter will be addressed during negotiating sessions between the Department and the Bureau.

Contracting Issues

11. If water is made available by the CVP to meet Delta water quality standards, should it be done on a non-reimbursable basis? Who would pay if it was done on a reimbursable basis?

Answer

The Department takes no position on the Federal matter of how CVP costs should be allocated. The State Water Project considers meeting water quality standards in the Delta a reimbursable function, since Delta standards are based for the most part on mitigation rather than enhancement. It is a cost of doing business that is borne by our water supply contractors. For example, agricultural standards are based on protecting superior water rights of Delta water users. Similarly, fishery standards are based on maintaining the fishery at levels representative of "without project" conditions -- conditions that would be expected to have existed if the SWP and CVP had not been built. To the extent that enhancement of fish and wildlife and for recreation is provided, state law specifies such costs as nonreimbursable (Water Code section 11900 et seq.).

12. The COA provides for a process whereby a contract will be executed for the sale of water from the Federal CVP to the SWP (Article 10(h)). However, there is no process established for the sale of State Project water to the Federal CVP. Shouldn't there be such a provision?

Answer

The intent of Article 10(h) is to deal with sale of firm water supplies on an interim basis. The SWP long-term water supply commitments exceed our present dependable supplies, and we expect this situation to prevail for the foreseeable future. Accordingly, the SWP does not have excess firm, dependable water supplies available for sale, and we do not see a need for a SWP water sale provision in the COA. In contrast, the CVP will have excess supplies available for sale for the next 15-20 years, until such time as CVP service area demands increase and additional transportation facilities are built. While the SWP does not have excess firm water, in years we will have some supplies available in excess of demands. However, such excess supplies will exist at the same time as excess supplies exist for the CVP. During 1977, some SWP water was provided to CVP contractors under a special arrangement with the Metropolitan Water District of Southern California, (MWD) a major SWP contractor. In 1982 another special arrangement with MWD allowed SWP water to be provided to the CVP due to the repairs on San Luis Dam and consequent unavailability of San Luis Reservoir for full use of 1982. Such special arrangements are less likely in the future due to SWP water supply and demand circumstances. However, they can be accomplished without provisions in the COA.

13. Does this agreement explicitly or implicitly make any commitment or convey any understanding as to how and to whom water made available as a result of the COA will be placed under contract?

and

14. What criteria will be used to market water made available as a result of this agreement?

Answers

Provisions of Article 10(h) impose certain explicit preconditions to an expected agreement for sale of CVP water to the SWP. Those preconditions are specified in 10(h)(1), 10(h)(2), and 10(h)(3) of the COA. These preconditions contemplate that the SWP will provide conveyance services to transport CVP water to CVP contractors in exchange for availability of CVP supplies to SWP contractors.

Any water purchased by the SWP will be used to meet existing contractual obligations. No new contracts are anticipated.

Article 11

15. Please explain the factors and circumstances that led to the resolution of the issues raised in Article 11.

Answer

Article 11 covers two main areas. The first of these is the requirement that both projects must be operated to meet the Delta Water Quality Standards contained in Exhibit A. As previously stated in the response to question 1, these standards are extracted from the current State Water Resources Control Board Decision 1485. This never became an issue, because from the outset both parties had as a prime objective coordinated operations to the same water quality standards. When operations studies established that the projects could be operated to the standards in Exhibit A without jeopardizing existing contracts and the ability to meet project purposes agreement was readily arrived at.

The second issue covered in Article 11 concerns the applicability of any new standards that may be adopted by the State Water Resources Control Board. This clearly was the most difficult issue to resolve in the entire agreement. It represents a basic Federal/State conflict. Federal interests do not want to agree in advance to meet unknown and possibly unreasonable (in their view) future standards that may reduce the yield of the CVP, impact revenues or affect power generation. On the other side, the State Water Project is required to meet all validly adopted standards issued by the SWRCB. Should the Federal Government not "meet its share" of such standards there would be a greater impact upon the State Water Project. Beyond the impact to the State Water Project, the authority of the State Water Resources Control Board to condition water rights permits of the Central Valley Project is directly involved. This authority, of course, is considered to be a possible infringement on the authority of the Secretary of Interior to operate the CVP. In 1978, the U.S. Supreme Court ruled in California v. United States that the State Water Resources Control Board may impose conditions on the Central Valley Project that are not inconsistent with congressional directives respecting the project. Because the Congress will take action regarding the COA prior to its execution by the Bureau of Reclamation, the COA will in effect be a congressional directive respecting the project. During the long COA negotiations, it became apparent that there was no other way to deal with possible changes in the water quality standards than to leave it up to the courts under existing law. Therefore, Article 11 was constructed to be neutral on this issue. One factor that was considered is that changed water quality standards may never become a real issue. It is quite possible that the SWRCB will not adopt standards that the Secretary of Interior would consider as inconsistent with Congressional directives.

16. Do you believe Article 11 will insure that the Federal government will do its share to meet Delta water quality standards now and in the future?

Answer

Yes, because of a growing and broad consensus that this must be the case.

Drought

17. If there were a recurrence of the 1977-1978 drought with the COA in place, how would the projects be operated differently to protect Delta water quality? What would be different about the projects' responses to the drought with the COA in place?

Answer

The main effect of the COA is that both projects would operate to provide the same level of protection to the Delta, i.e., the water quality standards in Exhibit A.

The greatest difference in operations from 1976-77 when the next drought occurs is that the 76-77 experience has resulted in a different, more cautious approach to operating both projects. The drought was the first time the projects had to operate under such conditions. The data obtained on actual conditions rather than previous assumptions were used in the operation studies and agreement on hydrology that are the foundation of the COA.

18. Please describe experiences that took place during the drought of 1977-78.

and

19. Which project had to assume major responsibility for Delta water quality protection during this drought?

Answers

The 1976-77 drought in California was the worst dry period since records have been kept and there were many experiences too numerous to mention here. The enclosed bulletin entitled "The 1976-77 California Drought - A Review" was issued in May 1978 which summarizes statewide experiences.

Operation of State and Federal projects by the Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (USBR) was complicated by the low storage in upstream reservoirs, high use throughout all service areas, and extremely low return flows. In 1976, the SWP was operated to maintain Delta water quality objectives established by the State Water Resources Control Board (SWRCB), whereas the CVP was operated to meet water quality standards deemed adequate for agricultural use. Thus, in 1976 coordinated Federal-State action was complicated by the USBR's failure to provide sufficient releases to maintain accepted standards of protection for Delta users, exposing its Contra Costa County customers to levels of salt content considered hazardous to health. As a consequence, DWR was forced to take certain actions to protect those and other users. During periods when the SWP was maintaining water quality standards different from CVP standards, the SWP provided about 85,500 acre feet of additional water for Delta outflows. If the CVP had been in agreement with the SWP on the water quality standards, the CVP would have provided about 48,000 acre feet of the additional water needed for Delta outflow.

Through 1976, it was possible to provide sufficient upstream storage releases to meet the applicable Delta water quality standards contained in the Water Quality Control Plans (Basin Plans) and the projects' water rights permits. By December 1976, however, it was clear that with the continuing drought, the State and Federal water storage facilities would be dangerously low if the projects continued to be operated to meet the standards. After hearings, the SWRCB adopted an Interim Water Quality Control Plan on February 8, 1977, which modified the Delta standards to levels that could be met with smaller project releases.

The SWRCB adopted a second modification on June 2, 1977, known as the "Emergency Regulation Order", which established drought emergency regulations for conserving limited water supplies upstream from the Delta and was to be in effect until December 31, 1977. It changed the Delta water quality standards to further reduce the quantity of water required for Delta outflow.

These SWRCB modifications were necessary to ensure that there would be enough water held over to protect the Delta if the drought continued into 1978. The Department estimated that if the February 8 interim standards remained in effect, power generation at Oroville would be halted during the summer. Also, the water supply would have been totally exhausted in November 1977 and again in the summer of 1978 if the drought continued. This would have resulted in salt

water intrusion into the Delta with no water available to flush it out.

The water saved as a result of the two modifications remained in storage at upstream reservoirs of the SWP and CVP. Because November and December 1977 were also dry, on December 15, the SWRCB extended the June 2, 1977, emergency regulations into 1978. However, after late December 1977 and January 1978 storms, the water supply situation improved greatly and the Emergency Regulations were lifted on February 2, 1978.

Despite the reductions in Delta outflow requirements, both the SWP and CVP had to impose severe reductions of water deliveries to their contractors. The major event that helped alleviate the statewide water shortage was that The Metropolitan Water District of Southern California (a SWP water contractor) agreed to relinquish about 400,000 acre feet of its SWP water and increased its diversions from the Colorado River. The relinquished water was sold to other SWP contractors, non-contracting municipalities in the San Francisco Bay area, and approximately 8,000 acre feet was sold to the CVP agricultural contractors. The SWP also "loaned" 75,000 acre feet to the CVP during the peak 1977 irrigation seasons from San Luis reservoir. This was "repaid" in the fall of 1977.

Suisun Marsh

20. What is the present status of negotiations to determine how best to achieve water quality standards for the Suisun Marsh?

Answer

Substantial agreement has been reached in the negotiations. Two issues remain unresolved. These involve the question of interim standards for the western Marsh prior to construction of all facilities and the question of whether or not specific performance toward compliance with the contract can be required of the U.S. Bureau of Reclamation. It is the position of the USBR that there has been no waiver of sovereign immunity to cover the proposed agreement. It is anticipated that these issues can be resolved and negotiations concluded in 1985. The parties to the agreement will then petition the State Water Resources Control Board to adopt the water quality standards of the agreement and incorporate the agreement in the projects water rights.

21. How will any agreement reached on the Suisun Marsh be integrated with the COA?

Answer

The COA contains a provision for amendments to integrate new facilities (Articles 14 and 16). The water quality standards pertaining to the Suisun Marsh would be amended into Exhibit A and any adjustments necessary to the sharing formula and Exhibit B would

be made in accordance with Articles 11 and 6 respectively. It is anticipated that prior to the fall of 1988, when the new standards contained in the Marsh Agreement will start to take effect according to an agreed upon schedule, an amendment to integrate the Marsh Agreement with the COA will have been negotiated.

22. Will facilities need to be constructed in order to insure protection of water quality in the Suisun Marsh?

Answer

Yes, facilities will be required. Ensuring protection of the Marsh with outflow alone during dry periods would require exorbitant quantities of water and is considered to be a waste of water under the California Constitution. Three of the facilities needed to ensure protection of water quality in the Suisun Marsh have already been constructed. These are: the Morrow Island Distribution System, Goodyear Slough Outfall, and Roaring River Slough. The next facility to be constructed is the Montezuma Slough Control Structure. Construction on this facility is anticipated to begin in early 1986, with completion in the fall of 1988. The full extent of any additional necessary facilities will be determined by examining the effects on water quality of the operation of these facilities.

Other Issues

23. On page 26, what is meant by Article 17, in which it is agreed that the State and the United States agree: "that they will respect each others project service areas"?

Answer

This is a provision carried over from the 1960 Agreement that merely means that we are not going to compete with each other for "customers".

Appendix K

CALIFORNIA ENVIRONMENTAL QUALITY ACT
CRITERIA FOR SIGNIFICANCE



APPENDIX K

CEQA GUIDELINES

Significant Effects

A project will normally have a significant effect on the environment if it will:

- (a) Conflict with adopted environmental plans and goals of the community where it is located;
- (b) Have a substantial, demonstrable negative aesthetic effect;
- (c) Substantially affect a rare or endangered species of animal or plant or the habitat of the species;
- (d) Interfere substantially with the movement of any resident or migratory fish or wildlife species;
- (e) Breach published national, state, or local standards relating to solid waste or litter control;
- (f) Substantially degrade water quality;
- (g) Contaminate a public water supply;
- (h) Substantially degrade or deplete ground water resources;
- (i) Interfere substantially with ground water recharge;
- (j) Disrupt or adversely affect a prehistoric or historic archaeological site or a property of historic or cultural significance to a community or ethnic or social group; or a paleontological site except as a part of scientific study;
- (k) Induce substantial growth or concentration or population;
- (l) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system;
- (m) Displace a large number of people;
- (n) Encourage activities which results in the use of large amounts of fuel, water, or energy;
- (o) Use fuel, water, or energy in a wasteful manner;
- (p) Increase substantially the ambient noise levels for adjoining areas;
- (q) Cause substantial flooding, erosion or siltation;
- (r) Expose people or structures to major geologic hazards;

- (s) Extend a sewer trunk line with capacity to serve new development;
- (t) Substantially diminish habitat for fish, wildlife or plants;
- (u) Disrupt or divide the physical arrangement of an established community;
- (v) Create a potential public health hazard or involve the use, production or disposal of materials which pose a hazard to people or animal or plant populations in the area affected;
- (w) Conflict with established recreational, educational, religious or scientific uses of the area;
- (x) Violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations;
- (y) Convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land;
- (z) Interfere with emergency response plans or emergency evacuation plans.

CONVERSION FACTORS

Quantity	To Convert from Metric Unit	To Customary Unit	Multiply Metric Unit By	To Convert to Metric Unit Multiply Customary Unit By
Length	millimetres (mm)	inches (in)	0.03937	25.4
	centimetres (cm) for snow depth	inches (in)	0.3937	2.54
	metres (m)	feet (ft)	3.2808	0.3048
	kilometres (km)	miles (mi)	0.62139	1.6093
Area	square millimetres (mm ²)	square inches (in ²)	0.00155	645.16
	square metres (m ²)	square feet (ft ²)	10.764	0.092903
	hectares (ha)	acres (ac)	2.4710	0.40469
	square kilometres (km ²)	square miles (mi ²)	0.3861	2.590
Volume	litres (L)	gallons (gal)	0.26417	3.7854
	megalitres	million gallons (10 ⁶ gal)	0.26417	3.7854
	cubic metres (m ³)	cubic feet (ft ³)	35.315	0.028317
	cubic metres (m ³)	cubic yards (yd ³)	1.308	0.76455
	cubic dekametres (dam ³)	acre-feet (ac-ft)	0.8107	1.2335
Flow	cubic metres per second (m ³ /s)	cubic feet per second (ft ³ /s)	35.315	0.028317
	litres per minute (L/min)	gallons per minute (gal/min)	0.26417	3.7854
	litres per day (L/day)	gallons per day (gal/day)	0.26417	3.7854
	megalitres per day (ML/day)	million gallons per day (mgd)	0.26417	3.7854
	cubic dekametres per day (dam ³ /day)	acre-feet per day (ac-ft/day)	0.8107	1.2335
Mass	kilograms (kg)	pounds (lb)	2.2046	0.45359
	megagrams (Mg)	tons (short, 2,000 lb)	1.1023	0.90718
Velocity	metres per second (m/s)	feet per second (ft/s)	3.2808	0.3048
Power	kilowatts (kW)	horsepower (hp)	1.3405	0.746
Pressure	kilopascals (kPa)	pounds per square inch (psi)	0.14505	6.8948
	kilopascals (kPa)	feet head of water	0.33456	2.989
Specific Capacity	litres per minute per metre drawdown	gallons per minute per foot drawdown	0.08052	12.419
Concentration	milligrams per litre (mg/L)	parts per million (ppm)	1.0	1.0
Electrical Conductivity	microsiemens per centimetre (uS/cm)	micromhos per centimetre	1.0	1.0
Temperature	degrees Celsius (°C)	degrees Fahrenheit (°F)	(1.8 × °C) + 32	(°F - 32) / 1.8



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